No. 54.] [April, 1889.

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY.

I.—THE DOUBLE BRAIN.

By Henry Maudsley, M.D.

I.

Is the brain, which is notably double in structure, a double organ, "seeming parted, but yet a union in partition"? Or is it a seeming whole made up actually of two organs? Have we, in fact, two brains as we have two eyes, two lungs, two kidneys? Or have we one brain as we have one body, built up of two similar halves?[1]

Whatever the fact, we are entitled to declare the action of both halves or of both organs to be necessary to the fullest function of the organism. We see better with two eyes than with one eye, breathe better with two lungs than with one lung, do more with two arms than with one arm, although one eye, one lung, one arm will serve in case of need. This is true where the organs are two, separate and independent,

[1] In his original and suggestive book on *The Duality of the Mind* (1844), a book which has never perhaps obtained the attention which it deserved, Dr. A. L. Wigan enunciated and maintained the doctrine that the two hemispheres of the brain are really two distinct and entire organs, and each respectively as complete (indeed more complete), and as fully perfect in all its parts for the purposes it is intended to perform, as are the two eyes.

much more true, therefore, where the organ is one whole made up of two halves. In the former case the loss of one organ would mean so much subtraction of function only, a loss which might be made good by the increased action of the other that was left; in the latter case the loss of one half would not be a lessening only, but a laming of function, which could not be compensated by any increased action of the remaining half.

When we reflect upon the intimate constitution and structural connexions of the brain, it seems the natural conclusion that it is not formed of two distinct organs any more than the body is formed of two distinct bodies; that, like the body, it is a bilateral structure. Essentially it is a great aggregate of nerve-centres and nerve-tracts, part of, and administering organ in, a circle of communication between the organism and its medium, nowise a separate and paramount centre of authority, a sort of supreme organ apart, as ordinary language might seem sometimes to imply; an aggregate with which all parts of the body are in communion, mediate or immediate, in which they may be said to have direct or indirect representation, through which the whole works in each part and each part in the whole; and it is bound, therefore, by its constitution and relations, however great the separateness of its halves in respect of some functions, to be fundamentally a double organ ministering to one function, the function of one body. It represents at the same time the halves of the body and the unity of the whole whereof itself is part.

That the halves of the double brain, like the halves of the body, have corresponding functions, one perhaps having fuller function than the other, but the work being of the same kind, is a conclusion warranted by (*a*) their similarity of conformation and structure; (*b*) the fact that they are respectively in communion with and representative of similar organs and structures of the body; (*c*) the observation that the one hemisphere may do the work of both hemispheres in thinking and feeling when the other is destroyed; (*d*) the results of artificial experiments on animals and of the natural experiments yielded by disease in man, which agree to locate many corresponding sensory and motor centres of the cortex in the hemispheres.

Are the halves of the brain capable of acting singly as well as conjointly? Of this there can be no doubt. The right half certainly governs the movements of the left limbs and the left half the movements of the right limbs; wherefore, when anyone makes a series of movements with his right

hand while his left hand is at rest, the proper nerve-tracts of his left hemisphere are working while the corresponding tracts of his right hemisphere are at rest. Moreover, so far as he is planning his acts and thinking of what he is doing, that is to say, performing his movements ideally, we must assume that the cortical plexuses of the brain, the thought-substrata of it, are at work on the left side and at rest on the right side.

It is certain, again, that the two sides of the brain are able to act differently when acting together—that they may direct different but harmonious movements in the corresponding limbs of the opposite sides of the body. In various complex feats of bodily skill, in which each limb is differently employed at the same time while co-operating to a common end, the right brain must be occupied in directing a series of movements of the left arm and leg, and the left brain a series of movements of the right arm and leg. Moreover, the movements in either case might be such as the proper hemisphere only could accomplish. There are notably movements which the one hemisphere can, but the other cannot, do: the act of writing, for instance, implies an orderly series of finely specialised movements of the right hand which the left hemisphere has been patiently educated to command and execute, but which the right hemisphere certainly cannot command the left hand to perform; therefore the right brain is at rest when the tracts of the left brain which subserve writing are at work, and cannot even think the special movements when the left tracts are destroyed. It is the same with speech, the cerebral centre of which is proved by pathological observations and experiments on animals to be in the lower part of the third or ascending left frontal convolution. Indeed, the capacities of the most highly specialised movements seem, so far as we know, to be contained only in one—the opposite—hemisphere. The most highly specialised movements of the hand, at any rate, are lost after a complete destruction of the proper cortical centres of the forearm and hand; permanent paralysis ensues, since the other hemisphere does not take up the work. It cannot do so, presumably because it has not been taught the fine special work.[1]

[1] It is almost universally admitted now that each cerebral hemisphere contains the centre of voluntary movements and of sensory perceptions for the opposite side of the body; experiments on animals and observations of disease in man having apparently put the conclusion beyond all reasonable question. All the more surprising is it, therefore, to find Prof. Brown-Séquard continuing to express an unqualified dissent and

From what has been said it appears plainly that the functions of the hemispheres, and of the respective tracts in them, may be—

(1) *Single*—when one may replace the other, directing the same kind of act with a different instrument, as when either right or left hand is used, or when the one hemisphere does work which the other cannot do.

(2) *Conjoint and correspondent*—when they combine the same series of movements to a common end. When they do that, as they do for the most part automatically, having been patiently trained to the work, it is probable, almost certain, that the impulse from one hemisphere suffices to excite the proper movements, either because it acts upon associated subcortical motor centres which are the more direct agents of them, or because it instantly draws in its train of action the associated cortical centres in the other hemisphere. In the former case the subordinate centres form a bilateral nucleus or centre; in the latter case the supreme cortical centres have that character. For we may note here that it does not matter whether the associated centres in such case lie close together so as apparently to form one organ or not; if they are closely united in structure by fibres of association, and habitually associated in function, they are practically one notwithstanding that they lie some distance apart. From experiments on animals we learn that, when a cortical centre innervating muscles which are in the habit of acting in concert with corresponding muscles on the opposite side is destroyed, the corresponding centre in the opposite hemisphere takes up the function of the destroyed centre, and so prevents permanent paralysis.

(3) *Conjoint and different*—when the hemispheres combine to dictate different movements of the two sides for a common end, just as the eyes combine their different

believing that he has demonstrated the accepted localisation to be erroneous. In a recent number of an American popular journal (*Forum*, vol. v., No. 2, p. 169) he says: "I have shown by a large number of facts that this localisation is erroneous. In reality we have two full brains, as each hemisphere is endowed with all the powers we believe to exist in the two cerebral halves. It is now recognised that one-half of the cerebrum is enough for all intellectual functions; but facts show that this is the case also for the power of speech (notwithstanding what is so often seen in cases of aphasia), and for all the motor, sensorial and sensitive functions." One would receive this opinion of so practised a vivisectionist with more assurance had any adequate result ever come from the multitude of his cruel experiments through a long physiological life.

visions of one object. And here it may be noted that the principle holds which was observed in corresponding movements of the two sides—namely, that centres habitually associated in function, although it be not now in correspondent but different movements, become in respect of that function practically one, a bilateral nucleus or organ, only with its halves of different structure, when the excitation of one will be the excitation of both.

Although the most highly specialised movements are thought to proceed from one hemisphere only, the conclusion may not be true of such highly specialised movements as are done habitually by the two hands in concert. In this case the necessary muscles on the two sides which act in concert might probably be put into action from either hemisphere, as happens with the movements of the two eyes, of the two sides of the face, of the two vocal cords. Adequate account must be taken of the effects of education. It would be quite possible to teach a child to write with its left hand instead of with its right hand, in which case the right hemisphere would be taught; or to teach it to write with both hands, if it were worth while, in which case both hemispheres would be taught; or to teach the two hands to act habitually together, if not in writing, at any rate in the performance of movements as fine and highly specialised as those of writing, in which case it is probable that either hemisphere would be able to actuate the necessary movements. Now it is notably much easier to teach the right hemisphere writing than it is to teach it speech, and it is not difficult to understand why. In the first place, the hands are entirely separate and able to act independently, while the tongue is one organ, bilateral, which, from the first, has moved as a whole and been governed by one hemisphere; and, in the second place, the left hand has been through life trained to finely specialised movements which render it the apter to acquire the new specialised movements of writing. But the main reason is, perhaps, that years are required to learn the exceeding nice, exact, numerous and complex movements of speech, which really go along in their acquisition and development *pari passu* with the acquisition and development of reason, whereas the simpler, fewer and less fine movements of writing may be taught in a few months. Words being the symbols of reasoning, the definite fixing of them and of the fine shades of their meaning—the nice and exact organisation of their proper nervous substrata—need long time and work, but once they have been acquired it is not so difficult to

substitute other symbols for them; if a person, therefore, who has lost the use of his right hand retains his power of speech and reasoning, it ought to be little more difficult, if not easier, to teach him to write with the left hand than it was to teach him in the first instance to write with his right hand. To teach his right hemisphere language when he had lost the function by destruction of its seat in the left hemisphere would entail a far longer and more difficult labour; it can be done best, therefore, in children, in whom the effects of the destruction of the speech-centre in the third left frontal convolution are usually temporary, can be done also to a large extent, sometimes even entirely, in young adults, but can only be done very imperfectly at the best in old people.

It appears plainly, then, in respect of movements, that the hemispheres have not entirely correspondent and equivalent functions, but that beyond their functions in common either has a certain independence and particular function, directing some special actions of its own, and that the left hemisphere is commonly the most richly endowed, governing entirely some of the most specialised movements. What is true of the outgoing current in action upon the medium as movement is true also of the ingoing currents from the impressions made by the medium in sensation and perception; for it is impossible to separate the motor from the sensory element in perception, which is essentially reflex action at a higher remove.

It remains now to consider how the hemispheres act towards one another in thinking. If a person who is performing one kind of act with one hand and another kind of act with the other hand will endeavour to think of both acts at the same moment, he will discover that he cannot do so; although he can execute the respective motions simultaneously, he cannot think them simultaneously; he must pass in thought from the one to the other, a rapid alternation of consciousness taking place. The alternation, although rapid, is by no means instantaneous; it is distinctly succession, since there is an appreciable pause in the performance of it. A simultaneous consciousness in such case would necessarily be a distracted or dual consciousness, for it would be the coexistence of two different states of consciousness at the same instant. If it be true that the hemispheres can work together simultaneously at different work, but cannot think together of it simultaneously, it is evident that the conditions of joint motor work by them are different from the conditions of

joint consciousness—that they are more separate as conscious than as motor agents, or at any rate than the motor centres concerned. Is it that they act together like a bilateral nucleus in the motor work, but act independently in the consciousness of it? Or is it that the actual motor agency is in closely associated subordinate centres, and that its thought-representation, the ideal notation or symbolism of it, so to speak, is in the convolutions?

When we try to conceive the physical side of that alternating experience, there are three suppositions which it seems possible to make: (1) that consciousness exists at one moment in the one, and at the next moment in the other, hemisphere; (2) that the hemispheres act together by a sort of immediate sympathy or induction during the alternating instants that we are conscious of their respective doings, the one suspending its own consciousness and repeating instantaneously that of the other the moment we pass in thought from the work of one to that of the other—the suspension of function being limited to consciousness, since the motor work goes on; (3) that one hemisphere or one nervous tract of it can perform function consciously at the same moment that the other hemisphere or a different tract of it is performing a different conscious function.

The last supposition may perhaps be dismissed without more ado, since it would involve the coexistence of two different consciousnesses at the same instant; the second is improbable, since it postulates a repeating action of the second hemisphere which is hardly consistent with the continuance of its different motor work, and which seems unnecessary in face of the observation that one hemisphere suffices for consciousness; there remains, therefore, the third supposition, of an alternating action of the hemispheres corresponding to the alternating consciousness.

It seems so natural and easy for the hemispheres to act together in function that we do not sufficiently consider that it was necessary to teach them to do it in the first instance and how much teaching they required in order to do it. We cannot perform simultaneously different movements dictated by them until we patiently learn the habits by practice: the requisite movements must be made automatic by frequent repetition and laboured attention, if we are to succeed well. Consider how awkwardly incompetent everyone is to perform at the same time two different and strange actions, the one with the one and the other with the other hand: he cannot for the life of him keep them going together at first, but must pass from the one to the other, boggling with both,

until he has gained the skill of habit, when he performs them together with perfect ease. What is the process of learning? He begins by performing the movements on either side slowly and alternately; by and by, as he gets expert by practice, he does them more rapidly and alternately, and finally, as he gains complete skill, is able by practice to combine them and to do them easily together: he puts the hemispheres, in fact, into alternate action until the proper centres in them, or the proper subordinate centres, as the case may be, have been trained to such close and fit association as to act together automatically and as one centre. The conjoint action of the hemispheres is practically in that case the single action of one compound centre. Herein we perceive plain and pregnant proof of a continuous and gradual education for joint action, the extent of which, since it begins and goes on from the first moment of life, we do not commonly realise.

It is tolerably certain that the full function of such compound centre, once it has been thoroughly organised as such, can be instigated by an act of will proceeding from either hemisphere—that the excitation of either half of it in that way will be the immediate excitation of the other half. At any rate this is true when it is acting through instruments so separate as the two arms and legs. A skilful pianist who is able to converse at the same time that he is executing a difficult piece of music must, I take it, require for his performance some co-operation of the cortical tracts of his brain; and, if that be so, it is a reasonable surmise that the one hemisphere is employed in that function while the other is employed in conversation. When he first learnt to play that piece of music he was obliged to attend to each note as he struck it and to laboriously associate in action the proper tracts in the two hemispheres; at that time he could not for the life of him have carried on a conversation at the same time; but afterwards, when he has perfected the necessary mechanism of association by repeated practice, he is able to put it under the direction of one hemisphere and to employ the other differently. Not that there is probably in such case simultaneous consciousness of the different operations; such consciousness as there is being, I make no doubt, in extremely rapid alternations.

That which is true of parts so separate and independent as the two arms seems not to be true of parts so closely bound together structurally as to form one organ—the tongue, for example; its halves cannot act separately, they must act together in relation to one another and in relation to the

very nice and complex movements of the lips and palate. The *one* organ cannot in such case afford equal authority to two governing hemispheres, since its unity demands a unity of authority. And inasmuch as its halves have from the first moment of life been taught to act together, whichever hemisphere got the lead at the beginning—as the left hemisphere commonly would, the right side of the body notably taking the lead and getting the preference in education—was bound to keep it; the education of the other must needs be precluded by the ground being entirely occupied. How is it possible to teach the right hemisphere speech while the left is in full and active possession of the function? There is practically no organ for it to actuate, since the one organ has been appropriated by the left hemisphere, which cannot, or at any rate does not, suspend its function from time to time in order to give the right the opportunities to learn it. It would be easy to teach the latter writing, were it worth while, because it has a separate organ available for the purpose; but as we deliberately do not think it worth while to learn to write with either hand, although perfectly able to learn the double accomplishment, it is not for us to accuse nature of parsimony because she has deemed one hemisphere enough for speech, and so doomed to speechlessness the unfortunate person whose left frontal convolution has been destroyed, notwithstanding that the corresponding convolution of the right side remains safe and sound, and, so far as appears, functionless. Faithful to its central purpose of providing for the continuation of the species against all hazards by a profuse excess of germs, most of which are produced only to die, it has shown more regard to bodily propagation—since it leaves one testicle capable of full function when the other is destroyed—than to intellectual propagation.

Whence comes the unity of authority in the diversity of movements dictated by the hemispheres when they are cooperating in a common act? When the two sides of the body combine different movements to a common end we assign the governing principle to the brain, but from what higher source do the hemispheres of the brain obtain their governing principle of unity? How is it that when dictating different movements they yet have an understanding in common and work together to a common end? The answer is that the unity does not come from above but from below; it is not something imposed authoritatively on them, but something acquired painfully by them; they get their conception of the aim of the act, the unity of it, from the tedious

training of experience in doing it. Like the two hands, the two hemispheres cannot act together until they have been taught, and can only act together in that wherein they have been taught. I may perhaps compare their joint action to that of two lithe and supple acrobats who can writhe their bodies in a conjunction and succession of the most rapid, nice and complicated movements to perform skilful feats of tumbling, which they have thoroughly learnt to do by practice but cannot do until they have learnt them by much travail and pains. In that case we have two separate brains at work in a co-operation of the most thorough and exact adaptations to accomplish an end, the one brain taking the lead or yielding it to the other as required. What is it that unifies their action? The end or aim in view. And what is the end or aim? The conception or foresight of the act, its ideal accomplishment, which is derived from experience—either individual working experience, when it is exact, full and capable, or observation of the built-up experience of others, when it is vague and general only, incapable of unifying successfully the movements of the two bodies, capable only of supplying them with a general purpose to direct the work of gradual adaptation through repeated trials and patient practice. The purpose is complete and definite only when the effect can be completely and definitely accomplished. Now just as either of the acrobats has the conception of the aims or ends of his respective feats, and both must have a common conception in their workings together, so it is probable that either of the hemispheres has the conception of the end of a joint action, and that both have it in common when they begin to perform it.

In this relation it is of the first importance to realise and weigh well the great work of education in building up our perceptions, judgments and powers of action, none of which would exist without the training of experience. Certainly perceptions are not the mere impressions on sense which they seem to be when we have acquired them, but are acts of inference or judgment grounded on experience: so easy and natural to us are they when formed that we fail to remember that we were not born with them, and to realise how slow and tedious their acquisition was actually. The first movements of the infant are notably uncertain, irregular, uncombined; they become definite, regular, and are combined by practice; more and more so day after day by insensible degrees, until they attain an automatic ease and exactitude. The two halves of the brain, which could not in the first instance work together, learn to do so by

practice.[1] It is exactly the same probably with regard to perceptions as it is with regard to movements: they are at first confused, uncertain, perhaps even double, the infant seeing one object as two objects, but become clear, definite and single by practice; more and more so by insensible degrees, until they take place in the end easily and almost unconsciously. How then should the hemispheres think separately, any more than the two eyes see separately, when they have been trained to work together from the first moment of birth? The perception of an object means fundamentally an aggregate of the different sensory effects which it is capable of producing in one being and the different responsive movements which that being is capable of making in relation to these impressions;[2] wherefore, if his hemispheres acted separately in thought, he would be brought to the contradictory impossibility of thinking as two objects that in relation to which he, one being, had always been obliged to feel and act as one object. The unity of feeling and action must entail unity of thought. To have always seen two objects as equally real where there was only one object would have been to confound or actually destroy uniformity of action in regard to it—in fact, to preclude true apprehension of it in thought; practical life would then have been possible only on condition of some difference in the two impressions, whereby we might learn to regard the one and to disregard the other, as we notably do in some instances of double vision.

As it is evident that consciousness attends the training to act together of the nervous tracts or centres in the divisions of the brain, and lapses when by association of functions they have been so firmly co-organised as to act together as one, it is easy to understand that in ordinary perception and thought, the automatic kind of daily work which involves no great attention, the action of one hemisphere, if it suffice not of itself, may entail the requisite action of the other hemisphere. Presumably it is where the indi-

[1] No doubt there is a certain innate predisposition or inclination of the hemispheres to enter into joint action, a sort of waiting readiness, not otherwise than as in two bodies which, without previous instruction, accomplish a sexual union that is entirely new to them; and at any rate they can do together simultaneously what one might have to do successively, and so save time.

[2] The eye in perceiving or *apprehending* literally *grasps*, like the hand, only it grasps the image, not the object; and if the object be indistinct and uncertain, as it is when it is a long way off, the eye, like the hand, makes repeated grasps, as it were, until it hits on the fit one—searches and tries, in fact, until it succeeds in the fit motor apprehension.

vidual is labouring to grasp some new thought, to compass a new apprehension, or where he is giving strong attention to a process of reasoning—where, in fact, new adjustments and new combinations of nerve-plexuses to new facts and relations are being made—that the process of associating the hemispheres to act together in one function is going on. The fullest voluntary attention would seem to demand their conjoint action; perhaps the proportions and relations of things thus obtain representation in more adequate conceptions; there may be a strength and grasp of thought in the union which there could not be in the single action; and at any rate there will be a saving of time and wear by their doing together simultaneously what the one would have to do successively. So it is perhaps that we need the joint action of the hemispheres to apprehend best intellectually, just as we need the joint action of the two hands to apprehend or grasp best physically, and the joint action of the two eyes to see best. In looking at an object in front of me there is notably a part which I see with one eye only, a part of it which I see with the other eye only, a much larger, in fact the greatest, part which I see with both eyes, the fields of their visual consciousnesses coinciding there; instead of seeing two objects, as I probably did in the first instance when I began to see, I combine the two images, blending into one perception that which my eyes see in common in the object, and uniting it to that which either eye sees. So I get one object in relation to which I can act definitely instead of two objects in relation to which, both looking equally real, action would be confounded. If we suppose something of the same kind to take place in single function of the hemispheres, then in the joint action of them for a definite purpose—which we may take to be the equivalent of the joint bodily action itself at a higher remove—there will be that which is special to either hemisphere, however little in some instances, and there will be that large part which is common to them in most instances; and these elements will have been combined into one idea by the education of experience, as the impressions of the two eyes are combined into one image. Obviously the hemispheres are bound by their structural connexions with corresponding organs of sense and movement to have an immense deal in common. Now just as in vision, once the image has been acquired by experience, the momentary impression of the object on one eye is a sign quite sufficient to awaken it fully—(and a mere sign it is, which without the previous instruction we should no more be able to interpret into the object than we should

be able to understand the words of an entirely unknown language)—so may it be in thought that, once the idea has been acquired by experience, the least suitable stimulus to either hemisphere suffices to excite it fully.

If the hemispheres supplement one another in the acquisition and development of thought, we may well hesitate to conclude absolutely, as is sometimes done, that the complete loss of one occasions no impairment of the powers of mind. One would expect, *a priori*, to observe in a case of such damage less power of thinking new thoughts and more time taken in the process, less power of grasping and holding a thought, less power of sustained thought, less power of the functions which we include under the term attention. What are the facts? Unfortunately they are not yet accurately known; for although no appreciable injury to the mental powers has been discovered in those cases in which one hemisphere is said to have been entirely destroyed by disease, it is by no means quite certain that the observations were sufficiently thorough and exact—first, in verifying the completeness of the destruction of the one hemisphere, and, secondly, in making the careful inquiries necessary to test intimately and thoroughly the mental functions of the damaged individual. Those who have made the experiments on animals certainly hold it to be "a demonstrated fact that the removal or destruction of one hemisphere abolishes motion and sensation unilaterally, but leaves the mental functions unimpaired in respect of completeness; that the brain as ministering to motion and sensation is a single organ formed of two halves, but a dual organ as organ of thought".[1] But here again there may be excuse for some hesitation to accept the conclusion absolutely—at any rate, in its implied extension to man; for, in the first place, the very difficult business of ascertaining the animal's exact mental state after the severe experiment may well warrant some reserve of judgment, and, in the second place, it is hard to believe, if speech is located in the left hemisphere, that a man's intelligence can remain wholly unaffected by its entire destruction. It is obvious that he might have the ordinary feelings and thoughts of life, and behave like other persons in the ordinary relations of life, while many subtle defects were hidden under the show of complete soundness.[2]

[1] Dr. Ferrier, *Functions of the Brain*, p. 426, 2nd ed.

[2] It is the more difficult to accept unreservedly the conclusion of the singleness of the organ as ministering to motion and sensation, and of

It is perhaps easier to conceive that one hemisphere may do well the ordinary work of thinking, feeling and willing when the function of the other is entirely suspended or abolished than it is when its function is not abolished entirely, so leaving the sound one free play, but is deranged or discordant. In this case the sound hemisphere must, if the person is to remain sane in thought, take the lead and correct the disordered function of the unsound hemisphere. So only can unity of thought be preserved; for if there were equal authority in the deliverances of the two hemispheres, the one being as much regarded as the other, there could not fail to be distraction and the reign of disorder. The person would most likely think double, as he sees double when disorder of the action of the eyes, giving visual results contrary to his uniform experience, causes him to see one object as two objects; in which case notably he is sometimes able after a while to learn to disregard the second object—all the more easily when the two objects are wide apart than when they are close together or overlap. Now, if the one hemisphere can take so decided a lead as to control and correct the other when it is deranged, and in that way to maintain order over disorder, it may be taken as additional evidence that it can by itself subserve the ordinary processes of thought, feeling and will: a conclusion which obtains, perhaps, further confirmation from the fact, already commented on, that in complex action for a definite end one hemisphere may be dictating one kind of movement while the other at the same time dictates a different movement.

One loss the person who loses the use of a hemisphere certainly sustains—namely, the loss of nearly one-half his reserve-power; he has nothing to fall back upon should the serviceable hemisphere fail him. Moreover, a continued strain of work on this under all conditions of health, even when some temporary indisposition unfits it for full function, will predispose and may in the end lead to permanent disorder of its structure.

II.

When we exert will, either to think closely or to do resolutely, we draw upon the affective life or life of feeling for

its complete duality as ministering to thought, if we stand by the generally received doctrine of sensory and motor areas in the cortex. Are corresponding sensory and motor centres of the cortex on the two sides a single organ, and the closely adjacent or perhaps actually intermixed cortical centres or tracts of thought on the two sides entirely dual?

the driving force. The intellect deals only with the clearness or dimness, the definiteness or indefiniteness of ideas, it supplies no motive energy; all the ideas in the world might pass through it without there being any feeling or desire in relation to them—without appetence or inappetence; it would never experience the least motive of indulgence towards one rather than another, would never tend to one rather than another. The desire tinging any idea, the affective tone or element of the idea, its motive power, comes from the affective life. Now as it is certain that ideas belong to the cerebral hemispheres, being elaborated and performed there, so it is certain that the sources of the passions or affections of mind are distributed through the whole body; they spring and flow from the organic life, of which the so-called sympathetic system of nerves is the ministering nervous machinery. And here let it be noted that recent inquiries go to prove the sympathetic system not to be the separate and quasi-independent nervous system which it has been customary to regard it; so far from being a different system from the cerebro-spinal, it would appear to be actually neither more nor less than the splanchnic distribution or system of the cerebro-spinal. There are not, in fact, two nervous systems, but there is one nervous system with its different distributions.

Again, it is certain that the life of feeling is fundamental to the life of thought; it goes before it in the order of development and lies deeper in the individual nature—is rooted in the organic life and constitutes really the basic unity of the Ego, all whose passions and emotions are determined in character according as their exciting causes help or hinder its self-expansion. The fundamental note of the organic life, as of all life, is attraction and repulsion—to ensue what is profitable, to eschew what is hurtful, to it; and the organs of animal life inspired by it are really its means and instruments to accomplish this end. Their function is to sustain and maintain the organism by procuring food, by securing what is helpful and repelling what is hurtful to it, by embracing what is agreeable and shunning what is disagreeable —in fact, to protect and defend and further life in all ways. In like manner the function of the hemispheres, which are themselves incorporations of the capitalised experience of the life of the race in doing such work of protection and furtherance through the ages, is to assimilate in thoughts and actions what furthers development and to avoid what is adverse to it—to incorporate experience in structure and to use it serviceably; there being superadded in their nature in

the process of evolution, and they therefore superadding in the display of their function, all the social developments which the fundamental instincts and reflex acts have undergone—that is, the æsthetic developments from the mere animal, the rational from the instinctive, basis. What, in fact, it behoves us to apprehend clearly and to hold well in mind is that the cerebral hemispheres represent at bottom an aggregate of complex evolutions of the fundamental reflex acts of self-conservation and self-propagation; that they are the from-age-to-age-evolved instruments through which the most complex organism in the world gets into more and more intimate relations with the intricacies of external nature in the course of developing its fundamental self-conservative and propagative instincts. Their combined and separate actions are as the combined and separate actions of the dual organs of animal life, unified as they and these are by the basic organic life.

It appears, then, that the unity of the intellectual life which, so far as the division of the cerebral hemispheres is concerned, might apparently be almost dual, is based upon the unity of feeling, and this again upon the unity of the organic life. For although there is a symmetry of the organs of animal life on the two sides of the body, there is not a like symmetry of those of organic life throughout the body; most, if not all, of them are, it is true, symmetrically double in the earliest state of its embryonic development, but there is provision made in their subsequent union for the unity of life of the individual. We conclude, then, that it is feeling which gives welding unity to thought and from which power is derived; that the thoroughly combined action of the two hemispheres which was before judged to be necessary to the exercise of strong attention—necessary, that is, to the fullest accomplishment of the *wish* or *desire* to *tend to* an object—derives its principle of unity and motive power from the organic life through the sympathetic system of nerves.

It will help to make the apprehension of this matter more simple and easy if we think of all intellectual action as fundamentally a simple reflex act, or as a combination and series of such acts, the aim of which is to effect a profitable adjustment of the individual to his environment and of his environment to him, and in the end as complex machinery or agency for that purpose driven by the organic life. A want of adjustment on his part is ignorance and impotence, a wrong adjustment is error or delusion and false action; in the former case he does not get the good which he might get, in the latter case he gets positive harm. To make the best

adjustment possible is to secure the fullest intellectual development of his nature as it has been constituted for him by the capitalised or structuralised experiences of his forefathers through unnumbered ages. For it is at bottom the capital invested in structure which makes the endowments and limitations of his faculties. When a creature of the simplest organisation receives an adverse stimulus it notably shrinks or starts away from it instantly; it shows no disposition to endure or to repeat it and to endeavour to get into any relation of adjustment to it—that is to say, it cannot examine and reflect; but when a being of the most complex organisation receives an unwelcome stimulus he does not necessarily shun it instantly, although that may be his first impulse, since he has within him, incorporate in his mental structure, that organisation of experience which enables him to reflect it on to other tracts, or, in other words, to subordinate a present impression to wider considerations of future good; wherefore he endures it and adjusts himself to it, and gets advantage, it may be, from it—that is to say, he examines and reflects and acts in relation to it. In the end he perfects the right reflex acts in relation to it, when he is properly said to understand it; ever afterwards he can think it without performing it actually, performing it ideally in fact, confident what its value will be if proved by the test of actual experience. Knowledge is fit reflex action at higher removes—abstracts, as it were, from the concrete, not in the sense of real abstract existences, but as general signs or notations, each of which stands for or represents all particular ideas of the same class. The idea of an object is, so to speak, the mark and prognostic of the impressions and reactions which that object and all objects of the same class are able to stir in us.

We have now reached the point where appears plainly the full answer to the previously put question—to wit, how comes it to pass that the hemispheres of the brain, when dictating different movements, yet have an understanding in common and work together to a common end. They are organs of *one* body—two like structures moulded on one stem—in the organic life of which their basic unity lies; nowise supereminent and independent organs apart, that govern the body from the platform of a higher life, but organs of the body, living in it and by it and for it; and their functions are not, like those of the limbs, functions of the animal life only or mainly, but functions in which the whole life, animal and organic, is represented. It is from the life of the *whole* body that the constituents of the mental

life are derived, and inasmuch as the cerebral hemispheres are organs ministering to this life, they must necessarily have its fundamental unity. Superpose on this basal unity of being the effects of education of the hemispheres in joint working, begun with the first movements of life and continued throughout it, and we have a sufficient explanation of their communion of function in thoughts, feelings and acts.

III.

I pass on now to a rapid survey of some of the leading phenomena of mental disorder in order to see how they stand in relation to the foregoing conclusions. The two main types of mental disorder, mania and melancholia, notably present very different and almost opposite features: in the former there is great exaltation of self with answering lively display thereof in thought, feeling and conduct—phenomena witnessing to a generally brisk and easy reflex action; in the latter, great depression of self with answering sluggish expression of thought, feeling and conduct—phenomena witnessing to dull, slow and inert reflex function. The organic functions, moreover, share in the exaltation of the one state, in the depression of the other; if they do not actually do their work much better or much worse as the case may be, their tone is sensibly different, they doing in the one with ease and sense of satisfaction what they do in the other with labour and sense of oppression only. The contrast is most striking when the alternating phases of excitement and depression occur in immediate succession in the same person, as they do in the form of alternating mental disorder which is known as *circular* or *alternating* insanity. Now if it be true that the source of the exalted or depressed selfhood is in the organic functions, and true that the organic life supplies a basal unity to the action of the cerebral hemispheres, there ought certainly to be more evidence of their unity of action in the maniacal than in the melancholic type of disorder. What are the facts? Consider the typical features of the two states: on the one hand, exaggerated self-confidence and exultant feeling of well-being, quick and acute perception, extraordinary memory, overflowing rush of ideas, multitudinous projects, extreme susceptibility, voluble talk, unresting activity, an absence of all sense of effort, boastful self-assertion, delusions of greatness and power; on the other hand, loss of self-confidence and great self-distrust, no relish for or interest in or hold on the affairs of life, incapacity of

attention, sluggish and inefficient memory, deadness of feeling and dulness of thought, inability or aversion to will and act, sense of infinite effort in order to make the least exertion, despairing self-depreciation, delusions of ruin or damnation, or of possession or persecution by devil or other malignant power. The maniac never feels the least doubt that he is himself, when actually he is not himself but alienated from his true self; the melancholic feels and laments that he is not himself, that he and things around him are changed and unreal, that he is another self or in subjection to another self, when his main affliction is a loss of faith in self. The question is then whether it is right to look on this deep sense of the want of unity of being, this mental inability to realise self and its correlative loss of hold on the not-self, as being due to the failure of the organic driving force. That is the present contention: there is in fact the weakness resulting from the incomplete union or actual disunion, a self divided against itself by a commencing or completed disruption, and there are in consequence the dual and confusing suggestions of self coming from the weak and almost independent action of the disunited halves.

In taking account of the strange and gloomy ideas which arise in the mind under those conditions of disorder, it is important to remember that we have to do, not with the negative effects of lessened or lost function only, but also with the positive effects of the disordered function which is not lessened or lost. The supreme centres of the brain are constantly receiving impressions from without and from within the body; these impressions they under conditions of disorder work into all sorts of anomalous forms, just as they do in dreams; and so it comes to pass that when ordinary stimuli affect the individual, he, not realising their true nature because of his perverted sensibility, deems the stimuli themselves extraordinary and fashions them into monstrous shapes. If the hemispheres are not acting in unison, but differently and discordantly, it is manifest that there will be a confused and incongruous mixture of these disordered creations.

The phenomena of dreaming may be cited in further illustration and confirmation of the position here taken up. During sleep the organic life does not cease, like the animal life, but goes on at a lower rate of activity; the consequence being that the hemispheres, lacking the force necessary to full unity of action and yet taking up the organic impressions from the body, as well as any chance-impressions from

without, manufacture from them the most incongruous dream-images and events. Moreover, they are probably under this further prejudice, that they are deprived to some extent of the unifying effects of education, since the senses are closed and movements in abeyance: for education means education in strict relations to external objects; and although it is certainly possible to think without presentation of object to sense, yet there is no doubt that the habitual relations of sense to the external world, which exist when we are awake and hardly or not at all aware of them, do exert and quietly keep up a unifying and steadying effect upon the actions of the cerebral hemispheres. Deprived of this tacit control and weakened in their basal organic union, they deal riotously with the stimuli, seldom wanting, which make dreamless sleep a rare event; for the main conditions of such sleep are: first, a gentle and quiet action of the processes of the whole digestive tract and of all other functions of the organic life, so that no undue stimuli therefrom disturb the repose of the brain; secondly, an absence of all disturbing external impressions which, albeit not strong enough to produce wakening, are yet sufficient to affect the not entirely insensible sleeper and to be woven into the ravelled texture of his dreams; thirdly, a quiet brain—a brain, that is to say, which has not been made irritable and susceptible by excitement or exhaustion before going to sleep.

Reflect how painfully incompetent to perform a complicated act of contrivance and skill, even though it be a tolerably familiar act, or to give firm and consecutive attention to a subject of thought, a person is who has been rendered 'nervous,' whether it be by some moral or physical shock, or by some temporary bodily disorder, or by some other cause of nervous exhaustion and agitation, and how immediate may be the restoration of self-confidence and power from the taking of a glass of wine or other like stimulant of the organic energies. The acquired nervous incompetence of one who is temporarily incapacitated from doing well, or doing at all, what he can commonly do with skill and ease is very like the natural nervous incapacity of one who is learning anxiously by practice to do an act of the kind; in both cases there is apparently an ineffective co-operation of the hemispheres, due probably in the former to a loss of driving force, in the latter to an incompleted education.

Very remarkable is the cold collapse of self, the extreme prostration of body and mind, the almost entire extinction

of energy which a serious wound of the abdominal viscera occasions at once; the degree of instant collapse which takes place being out of all proportion to the immediate danger of the injury, fatal as this may prove in a few days by its disorganising consequences. Of a like kind, although less in degree, is the overwhelming prostration which commonly goes along with sea-sickness; a malady of so little serious moment in itself for the most part as to render the contrast of the accompanying abject moral prostration all the more remarkable and even ludicrous. When the deep foundations of self are shattered, as they seemingly are by sudden disorganisation of the sympathetic nervous system, the sufferer goes practically to pieces; as well he may, indeed, if these foundations are laid in the organic life.

It will be understood that the organic life includes not only those functions which serve self-conservation, but those also which serve reproduction, so long as they are active. Without them the self would be quite a different self, since they are necessary constituent elements of it. Now it is an observation which experienced physicians have occasion to make, that the premature loss of sexual power is apt to produce the utmost mental depression and may be a cause of suicide, and that a deep melancholic disorder sometimes follows its natural extinction. It is not simply that the person is bereft of a gratification which he would gladly have and is miserable in consequence, but he is reduced to a lower level of life so far as love of it and pleasure in it are concerned; not so much any measurable gap in his conscious life, an explicit sorrow of which he can give an account, but a deeper and more intimate loss, whereby everything seems to him stale, flat and unprofitable, and instead of having gladness in feeling and doing, it is pain and weariness to him to feel and do. Things and events he apprehends as clearly as ever he did, and judges rightly concerning them, but they pass before him in dream-like distance, as if they were a mechanical show which stirs not his interest nor touches his feeling; he has lost much of that affective intonation of his nature whence come desire and relish of them. All this seems the evident effect of the lowering of the force of organic life by the abstraction of the reproductive function from it: so much special vital energy has by the extinction of its source been subtracted from the stream of organic energy supplied to the brain, whose functions in consequence lack interest and are performed with greater effort. It is not for the most part our brains that wear out in old age; they would go on for a longer period were they properly fed

with energy from below, but it is the organic viscera which decay and fail in function; it is their failure which makes desire wane and the grasshopper a burden; they are the source of life's energy and relish, and their integrity and vigour the secret of an eager and active old age.

Having pointed out thus far how exaltation and abasement of the Ego or self answer respectively to *excess* and *defect* of the fund of organic energy in the brain, I go on now to note briefly that great *perversion* of this energy is followed by complete disintegration of the Ego or self. For this purpose I may fitly call in evidence certain cases of the deepest and most distracting nervous distress in which, without any known structural disease, a strange, disquieting, indescribable sensation is felt suddenly at the epigastrium or in its neighbourhood, diffuses itself vaguely through the body or mounts towards the head, and occasions instantly a distracting and overwhelming apprehension of impending dissolution of self: not a definite apprehension of death, nothing which can be grasped definitely in thought and feeling, but a vague, vast, indescribable feeling of impending horror, an unspeakable anguish. The impetuous and overpowering feeling is accompanied, perhaps, by the sense of a vehement rush of something, not blood, to the head, and may issue in scarcely resistible or actually irresistible impulse to an act of desperation, suicidal or homicidal, which is then, so to speak, the psychomotor convulsive outcome of it: in itself it is probably the pathological parallel on the sensory side of what convulsion is on the motor side. The sufferer who, after the attack is over, quietly recognises that his fears were groundless, and during it even remembers that he has had similar seizures before, cannot at the time of agony hold his intellectual ground at all; his power of thinking is abolished, his intellectual and moral unity dissolved, in face of the rushing mighty sensation of deranged organic unity.

In order to facilitate conception of the discordant action of the hemispheres and of its probable effects in thought, feeling and conduct, let us consider a person's movements when from deranged action of the dual organs of animal life there is no longer that unity of function which belongs to them in a state of health, and thereupon endeavour to imagine what the effect would be of a similar unity-destroying action upon the mental functions. Suppose a person to be afflicted with similar spasmodic or convulsive movements of the limbs of both sides, but not of such intensity as to incapacitate him from walking of a stumbling, rickety sort; imagine next his motions to be, like his thoughts, self-

conscious; what would be the revelation of themselves that they would make? Most likely an exultation and pride in their new activity, of the convulsive nature of which, being equally and similarly affected, they would be unaware. Let the supposition be of such a convulsive action of the limbs of one side only; what would be the revelation then? Of a self bound to another self which was hindering and opposing it—of a self divided against itself, a distracted or double self. Both in movements and in mental functions the full unity of function is the unity of a double organisation; wherefore, if there be duality, instead of unity, of the latter, we cannot fail to have phenomena marking the disintegration of self, cannot have phenomena that consist only with its integrity.

He who would pursue this inquiry into all its important consequences ought to go on to examine and reflect how such duality, instead of singleness, of function would affect particularly each of the different faculties or functions of mind—for example, memory, perception, judgment and will. Not memory, perception, judgment and will as *general* faculties or functions, be it understood, since in that sense they exist not, being no more than general representative signs or terms, but the *particular* memory, perception, judgment and will which is the living mental act. The memory, perception or judgment of one subject or of one part of the brain may be utterly wrong, while the memory, perception or judgment of another part of it is perfectly right; so that to speak of loss of memory and the like in general, without specifying the exact nature of the loss, is no more instructive than it would be to speak of loss of movement without specifying the particular loss and its exact nature.

As regards perception, it is obvious that a person whose hemispheres were at variance because of disorder of one of them must perceive a real object with the one hemisphere and an unreal object with the other, and perceive them both as equally real when equally vivid; his life, therefore, must needs be a succession of incoherent relations to the external world according as the one or the other was in the ascendant; at one time he would attend to and act in relation to his wrong perception, at another time he would attend to and act in relation to the true perception. In like manner his memory will be a memory of two selves, and oftentimes of two incompatible selves: he will speak quite correctly of actual events and his doings in them, so that there seems no fault in him, but immediately afterwards must speak with equal certitude of unreal events and

his supposed doings in them, so that there will seem no health in him. Judgment and will must necessarily be equally lamed and deranged, since the same division runs through them, and they must display the same sort of incoherent function. The individual will not only think double and perhaps act double, but the ideas of his double thinking and doing will be inconsistent and incompatible—he will be literally *distracted*.

Such are the effects which might theoretically be looked for from a dual and discordant action of the hemispheres. A survey of the phenomena of mental derangement discloses many facts that might be adduced in support of the theory. Take for first illustration the mode of coming-on and going-off of the attack in some cases of insanity: there is notable a brief period at the outset when the sound hemisphere appears to hold the lead and to repress or ignore the suggestions of the unsound hemisphere, whereas after a time of struggle and uncertainty the unsound hemisphere may be thought to gain the entire lead and to draw the other with it in such servitude that it does not rebel nor even suggest a doubt; and in like manner when the disease is passing off there are intruding intimations of doubt of the unsound thought which, little regarded at first, return in greater force by degrees and eventually grow to certainties that overcome and suppress its delusions. More striking still is the example of the person who is possessed by alternate voices, the one profane and blasphemous, the other reverent and devout; or of one who is to all intents and purposes two selves at the same time, his real self having his natural feelings and seeing things in their true light, and his morbid self with unnatural feelings and perverted notions, the two engaged perpetually in an inconclusive conflict which drives him to the deepest despair and perhaps even to suicide; or of one who, having extravagantly insane delusions on some subject concerning which he talks such absurd and incoherent nonsense as would seem incompatible with the persistence of any sense in the conduct of life, nevertheless exhibits such sound reason and good judgment on all other subjects as render it marvellous that he cannot correct his false bearings and put himself right with the world. Do not such facts as these suit well with the theory of a dual and inconsistent action of the hemispheres?[1]

[1] Many more illustrations of the same sort might be given; they are numerous enough, whatever their right interpretation. "Je me sens couché avec un *autre* moi-même," said a French patient, "qui me parle sans être interrogé et répond à mes pensées sans me laisser le temps de

It was previously mentioned incidentally that in some cases of double vision we learn to trust one eye and to disregard the deliverances of the other; and it is notable that it is easier to do that when the two visual images are wide apart than when they are close together or overlap. So in some sort is it with the double thought of mental disorder. In large asylums for the insane there are commonly two or three patients who, believing themselves to be royal or other great personages, accept quietly from day to day positions of service and do submissively mean work quite inconsistent with the claims they ought logically to make and maintain; their delusions are so far apart from the relations of their ordinary lives that for the most part they are disregarded, now and then only intruding actively and disturbing their conduct. But let a person be possessed with the delusion of his wife's infidelity, or believe that his neighbours or persons of his own household are saying insulting things to him or putting poison into his food, and he cannot so far disregard his delusions as to go on quietly at home, although he may so far distrust them as to conceal and even to deny them when challenged by strangers; they lie too near, or overlap, as it were, the thoughts and feelings of his daily life.

There are many more facts which deserve and might well repay examination in the light of the theory of a discordant action of the hemispheres, but it must suffice now to indicate in the briefest way two or three of them. One inquiry might be whether the theory is fitted to throw any light on the mental states of those more or less peculiar persons who, springing from families in which there is a decided insane strain, without being actually insane themselves, exhibit such anomalies of thought, feeling and conduct as to be known as odd, queer, eccentric. The best of them may possess remarkable abilities of a special kind, signalising themselves, perhaps, by a singular skill in punning or by wit of a higher order, or excelling in some particular line of art, musical, artistic or poetical; the worst of them exhibit undoubted marks of physical and mental degeneracy. One of the physical peculiarities noted sometimes in the most degenerate examples is a signal want of symmetry between the two sides of the face, or of the two sides of the skull, or of the two ears; and if it be true that, as Swedenborg used

les exprimer." A gentleman after five sleepless nights suffered from a form of fatigue in which "the brain seemed divided into two parts, thinking independently, and one side putting questions which the other answered".

to put it, whatever is displayed in the outermost is contained in the innermost, that would mean a corresponding want of symmetry between the two sides of the brain, with corresponding degrees of unsymmetric thought and feeling. May we thereupon suppose that some of the strange quips and cranks of thought and feeling displayed by the better-endowed possessors of an insane temperament betoken a disposition to separate and independent action of the hemispheres, a sort of nonconformity of functions?[1] It is interesting to take note in this connexion that it is precisely in those cases of insanity which own a strong hereditary predisposition that the most extravagant delusions on one class of subjects and the sanest reason on other subjects are found to exist side by side.

Another class of facts demanding curious attention comprises the remarkable disturbances of consciousness which occur in connexion with epilepsy. One well-known variety of the so-called 'aura' or warning which often goes before the epileptic fit is of an intellectual nature; not a simple sensation, nor a hallucination of one or other of the special senses, but what is called a thought or reminiscence, or a certain dreamy vagueness of thought which the sufferer feels it difficult or impossible to describe.[2] It occurs to him suddenly as something different from what he was thinking of at the time, an abrupt incursion of alien thought and feeling, or a seeming reminiscence of a scene or dream, producing the impression of two selves; it obscures or abolishes consciousness of other things, and is followed quickly by entire unconsciousness. Now, just as the convulsive movements of the epileptic fit may begin on one side and in particular muscles of that side, so may the intruding strange thought which goes before the fit originate probably in one

[1] In the Goulstonian lectures on *Body and Mind* before the Royal College of Physicians (1870), I pointed out that an inveterate inclination to punning was frequently an accompaniment of what I described as "the insane temperament" or, as it is now sometimes called, the neuropsychopathic diathesis. That was stated merely as a fact of observation, without any attempt at explanation. Does the explanation then lie in a certain separateness of action of the hemispheres, the proneness to which is constitutional, whereby the one hemisphere takes in the sense of what is said while the other is on the watch for the fit assonance and alliteration? It is curious to note that excessive punning is sometimes displayed in the stage of exaltation that goes before the actual incoherence of acute mania, when the highest powers of control are abolished, and I have known it to be developed after a severe shock to the brain which had damaged the memory and will and impaired the moral and higher social feelings.

[2] "On a Particular Variety of Epilepsy (Intellectual Aura)," by J. Hughlings-Jackson, M.D. (*Brain*, July, 1888).

hemisphere of the brain and in the local functional discharge of a particular part of it, and the singular feeling of a double self accompanying its intrusion perhaps be the result of the dissentient action of the hemispheres.

The last fact to which I shall refer is the singular feeling, which almost everybody has had more than once in his life, of having been before in exactly the same circumstances and having had exactly the same experience, notwithstanding that the experience was plainly and entirely novel. The feeling is not, I think, merely a flash of recognition, but is instinct with a sort of sure foresight or prophetic certainty of what is going to happen; not a memory certainly, since we cannot remember what has never happened; and it is at best a momentary consciousness which vanishes almost as soon as it is felt. Its nature and mode of occurrence seem to prove that it is an almost instantaneous, but not exactly consentaneous, double experience of the same event; and it is not an unreasonable conjecture, therefore, that the seeming recognition may be due to the instantaneously successive consciousnesses of the separately acting hemispheres. In this instance the hemispheres have exactly the same experience, whence the seeming familiarity; but in the perhaps not essentially different mental disturbance which precedes the epileptic fit they act differently, whence the strange feeling of alien thought and of a double self. And it is interesting to take notice in reference to this explanation that there is some reason to suppose that the persons who are likely to become epileptic in the end are exactly those who most often have the strange feeling of a previous identical experience.[1]

[1] Dr. Hughlings-Jackson says, in the paper just referred to, that he should never diagnose epilepsy from the paroxysmal recurrence of "reminiscence" without other symptoms, although he should suspect epilepsy, if the recurrence were frequent.

II.—ON SOME KINDS OF NECESSARY TRUTH. (II.)[1]

By Leslie Stephen.

I endeavoured in my preceding paper to trace the process by which we are led to form the conception of Time as something independent and definitely measurable. I proceed to speak of the analogous question of Space. In speaking of this—the most difficult problem—I must begin by saying distinctly what are the limits within which I must confine myself. I know, I am sorry to say, very little indeed of the recent investigations into the mode by which we learn to organise the various intimations of space-properties. When I read Prof. James's articles, I accept them as an ignoramus listening to the statements of an expert. I have no independent opinion whatever in the matter. I should, therefore, be silent were it not that I fancy that there is a logical question as to the meaning of our judgments of space, which is independent of a detailed knowledge of the complex system of sense-signals by which our judgment is formed. I am very likely quite mistaken; but one erroneous speculation more or less in this matter is hardly worth counting; and I shall simply give my view—without stopping at every instant to insert professions of incompetence—as though I were dogmatically certain.

A space-judgment is so far like a time-judgment that it is a statement of a relation between two phenomena. We have to find a common measure—a value of one space-relation in terms of others. Ultimately we say this distance is equal to, or in a certain numerical proportion to, another. And, as in time, we have to take some perfectly arbitrary unit. We know a minute only as the sixtieth part of an hour; and we fix the hour by its relation to a particular day—the 1st of January, 1887, for example. In the same way, a foot is a certain fraction of a mile, or a mile a certain multiple of a foot. The ultimate unit is arbitrary, the length of Edward I.'s arm, or a standard piece of metal at the Tower, or the length of the earth's diameter. Therefore, the statement that a thing is of certain length is a statement that it bears a certain numerical relation to some other thing; that it would precisely coincide with it if they

[1] Concluded from No. 53.

were placed together, or exceed, or fall short of it. We have the advantage that we can actually bring things together which we cannot in time; but, on the other hand, a whole system of complex propositions results from the attempt to give general rules as to their coincidence or otherwise.

First of all, then, can we say anything more about this coincidence? When do we call a distance 'constant,' or say that two separate things would coincide? It is clear that we only know of space-qualities through various sensations—smells, sounds, sights, touches, and so forth. The identity, therefore, of two objects in point of space must mean that under the same circumstances they would cause the same sensations. Here, again, we adopt certain familiar artifices. We clearly regard smells and sounds, and in a less obvious way sights, as indications of something else. They are signals of something; they do not enter into our ultimate judgments. I hear a sound and infer a bell, that is, a visible, tangible, resisting something. But my inference is not verified. I can see nothing and touch nothing corresponding to bell. Then I reject my previous inference. I correct it by interpreting the sound as meaning a bell in a different position, or, in the last resort, I set it down as an illusion. The sound must have been a singing in my ears, or such a fancy as Clapperton's when he was dying in Africa. By such an understanding it is easy to make things pleasant. We reject inconsistent experience *because* inconsistent, as we did in the case of time. Therefore, a sound is not an ultimate authority, but only gives *primâ facie* testimony. And the same is true of sight. I see a man, and my hand goes through him. Therefore, he is a ghost, not a man —or unreal. I see a surface in relief. My touch tells me that it is flat. Therefore, my eye kindly conforms to my fingers, or, if it will not, I disbelieve its testimony. It follows, it would seem, that a judgment as to distance is not a judgment about sounds or sights in the last resort. They indicate something else; they do not prove. This must be so, because I make it so, by instantly rejecting their testimony when it does not correspond to other testimony. The process is analogous to that already considered in regard to time, and corresponds, I presume, to one of the instinctive processes which physiologists can trace and analyse. At any rate, I have so managed matters that only one conclusion is possible. I have decided to reject all inconsistent testimony as inconsistent.

What, then, is the final authority to which all others

have to conform? When I say that a thing is at a certain distance I mean that it is or is not 'within reach'; and this means that a certain touch will be reproduced by a certain extension, or, of course, a certain system of touches by a corresponding system of movements. I use the word 'extension' in the vaguest possible sense, meaning that sensation, whatever it may be, which corresponds to reaching a given object. In order to make the statement accurate, we have, of course, as in the case of time, to substitute an objective and constant standard for the variable standard assumed in the first instance. But the question is, In respect of what is it taken to be constant? If I say that a thing is at a fixed distance, I do not assume a constant affection of the hearing or sight as given by that simple statement; I regard those sensations as signals of something else, and therefore their testimony as liable to be overridden by other testimony. I always assume, however, that the extension necessary to reach the object remains constant; that is, the extension due to the action of the normal or standard human being. Whatever errors may be made are corrected by reference not to some other criterion but by a due admission of the possibility of personal variation. If I am more tired at one moment than at another, the effort required to make a given extension will be greater. This correction is enforced upon me in the attempt to construct an objective world, and in applying it we act precisely as we do in other cases. We may assume the amount of effort to be measurable by some common and fixed standard. Supposing this to be done, by saying that a thing is at fixed distance, we necessarily imply that it can be reached by a fixed effort. The precise effort which we have to make at a given moment is of course variable; but the distance is made constant by the hypothesis that the change of effort is due to such a change, and to such a change alone; or, in other words, the real distance remains the same if this effort measured by the objective standard remains fixed. And, inversely, if more or less effort is required, we necessarily suppose the distance to be increased or diminished. The space-judgment, then, must at least include, and appears essentially to consist in, this judgment. Here, in short, is the independent variable to which a reference is explicitly or implicitly made in every judgment of distance. I, or rather the normal man, could not reach an object at that distance by a given effort.

This, as I understand, corresponds to the assertion that our judgment of space is formed from the 'muscular

sensations'. Now this seems to imply a difficulty. The supposed unit in which our judgment has ultimately to express itself is so vague that it seems incapable of giving rise to any accurate judgments, especially to the most precise of all possible judgments. It may—it seems that it must—be somehow latent in the judgment; but it is not the actual judgment. Nothing, certainly, can be vaguer than the muscular sensation itself. If we take such a familiar example as the skilled billiard player, we have an obvious illustration of the case. A stroke has to be delivered in a certain direction with a certain force at a certain part of one ball so that it may move with a certain velocity, strike another ball with a certain momentum, and set up a certain set of subsequent movements. It would tax the ablest mathematician to determine the exact position in which the cue is to be placed and the force of the blow to be struck. Again, the original data, the positions of the cue, ball and so forth, have to be determined from certain visual and other sensations, which involve complex problems of perspective, and therefore of geometry. If a specified and highly discriminated sensation corresponded to each position of the arm so that the right one could be picked out by the performer, we could partly understand the marvellous accuracy of his performance. But in point of fact this sensation seems to be of the very vaguest kind. All that takes place, so far as we can observe, is that he foresees what is going to happen, and that, therefore, it does happen. The sensations somehow solve all these amazingly intricate problems for themselves. And what is done by a billiard-player or a fiddler is only a further refinement of what everyone of us does in learning to walk or to talk, and what a swallow does when it catches an insect on the wing, or a tern when it plunges into the sea to seize a sand-eel. How the organism acquires these indefinitely delicate adjustments is a problem for the physiologist, at which I can only glance and pass by. My only purpose is to emphasise the singular vagueness of the muscular sensation which seems to be implied in the corresponding movements. If my hand and arm do so exactly what I want them to do, there must, one supposes, be some difference of sensation implied in the minutest change of position. Yet if there be one it is so slight as to be quite inappreciable in the developed consciousness, and we do not see how it can be discriminated from its proximate neighbour. I pick out, it seems, one pin from a million all indistinguishable in appearance, and I do it with unfailing accuracy. I do not

recognise the sensation by itself, but only as that which corresponds to some visual or tactual or audible sensation.

This, I observe, may equally be said of the vague feeling of duration. Accurate judgments of time enter into our actions as much as accurate judgments of space. When a man shoots a bird flying, he must implicitly estimate with extraordinary nicety the distance which it moves in a given period. If he shuts his eyes and tries to measure a period by his time-sensation, he will probably find himself hopelessly at a loss. If he looks at the bird flying, he will cause another body to move rapidly so as to intersect the line of flight at a given distance. The accuracy of judgment, therefore, does not depend upon his accurate perception of time considered abstractedly, but upon his accurate interpretation of certain visual symbols.

Now, I think that it is precisely this extreme vagueness which enables us to form necessary judgments, although we must look elsewhere to understand their extreme nicety. But, in order to show this more clearly, we must go a little further into the nature of the judgments which we actually form—whatever the complexity of the system of sensible signals by which we are enabled to form them. To take the simplest example, we may suppose that we see a marble, a hard, spherical object, revealed in the first instance perhaps by sight. We determine the position in space, the shape and size by putting out our hand and grasping it, rejecting all indications from the eye which are incompatible with the sensations given by the muscular action. If the marble moves, a different effort is required to reach any point of the surface, but the same sensations which determine the shape and size recur. The arm is extended further or not so far, and revives the same series of grasps and touches. Suppose, again, that the marble is made of putty, and that therefore whilst it is at the same distance it changes shape upon pressure. How do we interpret such a simple series of sensations? The hard, incompressible marble is taken to be the same thing, because it corresponds to the same system of touches and pressures. But they are revivable by different extensions. The marble therefore is at a different distance. When we press the putty again, it corresponds to a different series of touches. We explain this by saying that the thing has changed its shape. Now, I say, these inferences or modes of interpretation, virtually construct space as we before constructed time by help of an assumption that all the sensations shall be made consistent. For the same thing (that is, the same

in shape-relations) is defined to be that which produces the same series of sensations. If the same series of touches recurs after a different extension, we explain this either by supposing a second thing differing from the first in distance alone, or by supposing the thing to have moved to a different distance. In the latter case we suppose a change in the space-relations of the whole, though the relations between the various parts of the thing remain constant. We suppose that the thing has moved, and therefore that it might be replaced so as again to produce precisely the old sensations if the change were reversed; and further, that it actually does or might produce the same sensations upon another being, or upon ourselves after a supposed change in our own relations. And if, after all, this should not be verified, we suppose the thing itself to have changed. These hypotheses will enable us to reconcile any conceivable changes in our sensations, and since we have started from the assumption that the changes are to be reconciled, we naturally reach the result already predetermined in our assumption.

To work out the precise process by which the reconciliation is effected would be no doubt very difficult, and is in any case quite beyond my capacity. But it is easy enough to assign a hypothetical process by which some of the conclusions actually attained might be suggested, and which will perhaps show more clearly what I conceive them to be. We may, in the first place, imagine a being absolutely fixed, or, what is the same thing, accounting for everything by its varying distances from himself. So far as purely geometrical considerations are concerned, such a hypothesis is always possible at any stage of thought. Physical observations force us to make the hypothesis that we change our place as well as objects around us. But, from a purely geometrical point of view, all experience may be made coherent by assuming ourselves or any point in the universe to be absolutely fixed; or, in other words, by measuring all distances from any assumed origin. We may imagine, then, a fixed being (or a being who chooses to measure from himself as the origin) to recognise the world within his reach. Each object will then be definable as that which produces a certain sensation of touch when he makes a certain movement corresponding to some fixed muscular sensation. By renewing the same effort he reproduces the same series of sensations. He thus acquires a certain definite framework of regularly recurrent sensations. In fact we form such a framework, consisting of our habitual environment, room,

house, country, and ultimately solar system, to which we refer in order to obtain our bearings. But, as many things move, there are some sensations which do not recur. When I moved my hand along the table I met an obstacle—a matchbox—at a given distance. I and the table are still where they were. I revive, that is, precisely the same series of sensible impressions of the table. But the matchbox has moved. To revive that series of impressions I must make a greater extension. How do I explain the change? I assume none in myself. Nor do I say, as I apparently might, that there is now more 'space' than there was. I do not assume that the matchbox is a constant limit to space, which would make the movement along the table variable in spite of the identity of that series of impressions; but I suppose that the matchbox has moved, and that, instead of limiting, it only filled space. I assume, to make my impressions agree, that there was always a potential space, which the matchbox did not annihilate, but rendered inaccessible for the moment. The assumption leaves a certain difficulty, it would seem, for we are always unable to imagine the interior of solid bodies, and have to conceive them as made up of a series of surfaces or of potential systems of resistance indicated by potential touches. Thus, when we suppose a body to move we do not suppose space to be altered; but we imagine that the space was always there potentially. We act like the judicious lender of a book, who fills up the space which it previously occupied on the shelves by a wooden block. This artifice, then, is forced upon us by our resolution to preserve the harmony of our sensations. It enables us and compels us to preserve the original framework of sensation entirely unaltered. It is not read off simply as a set of permanent sensations, always to be evoked by a repetition of precisely the same effort, nor as a simply variable set of sensations, sometimes arising and sometimes not arising in correspondence with a given series of efforts, but as a set of permanent and absolutely unaltered and unalterable series of potential efforts. And the different sensations which occur are regarded as due to a change in something independent of ourselves, and as always capable of being referred to their proper place in the original framework. Any inconsistency now becomes impossible, because we take for granted that the observed differences are not to be referred to a change in the effort itself, but to a change arising elsewhere, and registered as different because occurring in different parts of the same framework. We need not, so far as the sensations themselves are concerned, have

recourse to this system; but until we have recourse to it the sensations must remain chaotic, grouped by no assignable rules, and therefore we have recourse to it.

A further step now becomes necessary. It would be so far possible to interpret my sensations consistently, whilst admitting qualitative differences between different regions of space. A set of sensations different in some respects must occur when I move my hand upwards or downwards, right or left, and so forth. Suppose, for example, that one hand touches a given point on a table, whilst the other rises to the lamp above it and then descends to the original place. The effort of raising the hand will be different from the effort in lowering it. So long as I simply regard the corresponding sensations as a series of consecutive events, there is in this no contradiction or difficulty. I might simply recognise the two series as different, and believe vaguely that the same would recur under the same circumstances. But, in point of fact, I make a more complex hypothesis. The two points, the lamp and the table, represent fixed data in my framework of actual and potential sensations. In order to carry out this hypothesis, I assume that if the points are fixed the distance is fixed. When I find that the actual effort implied in moving from one to the other is different, I am not content to take the observation simply. I virtually split up the sensation into two, and regard it as due partly to a uniform sensation, which corresponds to space in itself, and partly to a variable set of sensations due to some other cause, as in this case to weight. We suppose it to be a necessary truth that the distance from the tip of the tiger's nose to the tip of his tail is the same as the distance from the tip of his tail to the tip of his nose. The showman who declares that there is a difference makes a bull—a palpable contradiction in terms. If his assertion merely referred to the effort involved in passing our hand first one way and then another, it would not be contradictory, though it might be inaccurate. Why, then, is it absurd? Because, by the length we mean the effort due to the distance which is assumed to be constant—for we don't suppose the tiger to grow, and the two movements might be simultaneous. We have made an assumption precisely the same as that which we make in the case of touch. We discard differences because they are different; that is, we set them down to some other cause. We have to make such an assumption whenever we pronounce that a thing which has changed its position is nevertheless the same thing. This marble, for example, has moved; it

corresponds to a different set of sensations both of sight and touch, and a different set of potential movements of grasp and touch. We might explain this in various ways. Some of the sensations suggest identity, whilst others suggest change. We might be content to say, 'Here is a differing set of sensations'. When we say, 'This is the very same thing,' we virtually say, 'Here is one set of identical sensations *plus* another set of differing sensations'. We reconcile the varying suggestions by supposing a uniform sensation due to one cause, and varying sensations as due to another. The movement through a certain quantity of space corresponds to a uniform sensation, and so far as the sensations vary they must be due to something else. We must do something of the kind in order to preserve the uniformity of our framework. If I say, This is the same room or the same valley in which I was placed yesterday, it is not that the sensations remain identical. The effort required to put out my hand to the table or to move across the room varies constantly with the state of my body. I might suppose the house to grow larger with as much consistency as I might suppose my sensations to vary. But it is more convenient to regard it as the same house ; and in order that I may do so, I must consider that a certain normal or standard sensation would correspond to crossing the room, and that the difference is to be written off as due to something else—fatigue, for example. All this comes simply to defining space as that which does or would correspond to the normal and uniform effort. And, as in the analogous case of time, this involves a postulate which cannot be proved by direct experience. I say, indeed, that I can do in regard of space-measures what I cannot do in regard of time. I can bring two objects into actual contact, and therefore assure myself that they have certain definite relations in respect of length. But, in order to do so, I have always to assume that one or other of them is constant in respect of space. We take for granted that certain objects which correspond to a varying group of sensations are yet the same objects. Probably my first measure is a bit of myself. We are our own compasses as we are our own clocks. My foot is at first the measure of everything, and afterwards a particular thing, a rod or the diameter of the earth, which I take to be constant. Ultimately I find, as in the case of time, that no definable thing is absolutely constant in length. And whenever I measure one thing by another, I must assume that the changing group of sensations is the indication of an underlying uniformity with superficial variations. When I put my rod

in successive positions along the base of the pyramid to determine its length, I am really putting whole series of indefinitely varying sensations together; and it is only because I assume that in some way they also correspond to a series of uniform sensations that my process has any validity. That we are right in supposing that any greater thing is constant in length, as that we are right in supposing a day or a year to be constant in time, is only to be proved from the general harmony of experience thus interpreted.

One other remark must be added, which still corresponds to the remarks made about time. The process involves a separation of 'things' from ourselves, a belief that a thing, as a hypothetical cause of sensations, remains constant, though no longer represented by the same group of sensations. This becomes possible, however the process may be interpreted, whenever we come to form the hypothetical systems of potential sensations which are necessary in order to correlate our successive groups of actual sensations. And this process becomes necessary whenever I recognise the existence of other beings beside myself, and have to form measures common to myself and others as well as to my own successive states. There must be a corresponding development of my space-world. It must be that in which you and I live. It involves the possibility that I may move as well as the things by which I am surrounded. I can place myself at different points of the world I have now constructed as well as suppose a different set of relations of other things to myself. This must clearly correspond to an important stage of development. The difficulty with which it is effected seems to be indicated by the difficulty which still clings to us even in the most advanced stage. I habitually think of myself as moving, for I have learnt to think of the world as being equally measurable from your point of view or mine. But I still find it very difficult to think of the world common to me and the other persons actually known to me as movable. So much of the old mode of thought still survives, in spite of successive abstractions, that I naturally think of my up and down as absolute and universal, find a difficulty in conceiving of the antipodes as real, and habitually take the earth as the centre of all things. It is only when I have applied myself for some time to geometry that I can firmly hold to an abstract space as something absolutely uniform and identical in all its parts.

So far it would seem that the process by which we develop the conception of space is precisely analogous to that by which we develop the conception of time. That is to say,

the conception is forced upon us in the same way by the necessity of correlating our various sensations. All the later steps become necessary as soon as we have made the primary assumption, *viz.*, that we may compare things in respect of time alone or in respect of space alone. That is implicitly to assume that any two periods or distances have a definite numerical relation, and thus virtually to define time or space to be that which is uniform when the varying indications have been discarded. By the help of the various artifices which have been indicated we can always discard every inconsistent indication, because inconsistent; or, in the last resort, determine it to be an illusion. The process is of course facilitated by the fact that there are a great many things of approximately constant length in space as in time, so that our first rough assumptions are frequently justified. We have given concrete constants which do in fact correspond to real constants. And, in the next place, the process is facilitated in space as in time by the extreme vagueness of the supposed uniform element. Thus, for example, I can easily believe that the time which has elapsed during my walk is precisely the same as the time which has elapsed for you, who have been sitting still, because the vague feeling of duration from which alone I can immediately judge is so vague that it easily conforms to any assumption as to a supposed real or objective standard. If the time-feeling itself were very distinct, and thus separately recognisable, it would assert itself as something real, and I should find it comparatively difficult to apply the correction for personal error by which it is forced to conform itself to other indications or assumptions. As it is, there is no difficulty, or very little difficulty, in reconstructing my guess so as to force it into the desired harmony. Possibly it might be truer to say that the sense of duration has become vague because it has been forced to conform itself to my primary assumptions. The same may apparently be said of the sense of extension. The group of sensations which I take to indicate a particular thing—a measuring-rod for example—are in the highest degree distinct, and yet constantly varying for every position of the object. I see a rod, we will suppose, and every separate element of the visual sensation is perfectly distinct, so that I could recognise the slightest change. As the position of the rod changes the whole group of sensations changes, but I still regard the rod as the same. I take for granted, that is, that it would always correspond to precisely the same extension to move my hand, for example, from one end to the other, although the relation of the visual signals is

entirely altered. It is, I say, always easy to suppose this, because the sensation to be imagined is so vague that it easily conforms to any imposed condition, and therefore to the condition of assumed absolute identity. When, for any reason, I suppose the rod to be the same, I can always make it the same by an ideal construction which finds the required materials perfectly plastic, as they have no marked independent quality to give them rigidity.

It seems also to follow that this ultimate assumption may remain for a long time implicit. We have to act in conformity with geometrical principles before we have the slightest power of framing a geometrical axiom. The definite signals of sight determine certain actions without any conscious reference to the construction by which they are ultimately harmonised. This must be apparently the case in regard to those complex combinations which take place before there is any possibility of geometry, or perhaps any genuine space-conception. Simple geometrical figures such as spheres and straight lines and planes imply certain resemblances in the sensible impressions which may be felt before they have been definitely correlated and harmonised. The insect may make a 'bee-line' to a given point as a stone falls in a straight line, not because it recognises a straight line in the full meaning of the word, but simply because it is a symmetrically constructed machine, which moves in a straight line by the action of its wings. The flat may more or less distinguish itself from the rough and the round from the angular in the undeveloped intelligence, which merely perceives some sort of resemblance before it has the slightest power of accepting one of Euclid's definitions. We may at an early stage be in possession of an empirical geometry which corresponds roughly to the fully developed geometry. We do not yet know as a necessary truth that two sides of a triangle are greater than the third. Still we may move in a straight line to a given point before we can reason about lines. It is true as a general rule, though it is not true without exception, that it requires less effort to move along one side of a triangle than along the other two. Before we have any distinct knowledge of what 'sides' and 'triangle' mean, we may have the sensations which ultimately enable us to infer the straightness of particular lines, and may have roughly grouped them together. We may then perceive that the effort required for moving along the one is greater than the effort required for moving along the two. While we had no distinct conceptions of straightness or of lines, the proposition would still be empirical; it would be only true on the

average, because we could not assign the conceptions or make the necessary corrections. We could not distinguish between the effort due to the space and that due to any accidental circumstances. We should be in the same position in respect of space as we are in respect of time when we have only an impression that events synchronise or overlap and have not yet obtained any standard measure. If space was still measured by mere effort, it would appear that a zig-zag line up a hill was shorter than a direct ascent. As we learn properly to classify our varying sensations, the conception of space will gradually emerge and afterwards the whole system of geometrical truths. But the construction must be supposed to supervene upon a rough classification already adopted and gradually becoming distinct and precise as we form the necessary postulates.

So far the processes of forming a space-measure appear to be precisely analogous to the process of forming a time-measure. We have now to consider the further process in which time ceases to present any analogy to space. Time, as we know it, has only one, whereas space has three dimensions. The statement, 'So many years after or before the birth of Christ,' is an exhaustive answer to the question, When? I assume an arbitrary era and an arbitrary period, and, assigning the ratio of the period required to the fixed period, I must also call the past negative if I call the future positive; but in answering + or − 1000 years A.D. I answer the question completely. When you ask where a point is, my answer must be more complex. I must not only say so many miles from Greenwich Observatory, but add so many miles in such a direction; or, according to the ordinary method, so many miles north (or south), so many east (or west), and so many above (or below). It is, of course, owing to this that geometry gives rise to a system of necessary truths, not identical with arithmetical truth generally, but corresponding to certain definite arithmetical functions. As we may define the position of any point in a variety of ways, the various formulæ may be equated, and are 'necessarily' equivalent to each other. We have to consider, then, how we obtain those primary axioms from which all the subordinate theorems are deduced by familiar processes. We have actually unravelled the problem as soon as we have constructed our space-conceptions. The question is what principles were tacitly implied in this construction. To make this evident would be to show how far they were valid or necessary.

Let me, then, endeavour to bring out the logic of the procedure actually adopted. By the logic I mean of course the implicit not the explicit logic—the principles actually embodied in the formation of our intuitions, though not recognised in forming them.

What is the problem before us? We have to compare certain indications of the senses in such a way as to secure consistency. I have stated at sufficient length what are the artifices by which we discard any apparent inconsistencies. In applying them, we have virtually made assumptions implying again certain relations in our modes of measurement, which may also be regarded as limitations upon the possibilities of our method. To exhibit in detail what are these relations and the resulting limitations is to show the 'origin' of our geometrical axioms We have, in the first place, assumed the absolute homogeneity of space. The origin is absolutely arbitrary; or, in other words, precisely the same relations must be obtainable from any origin whatever. To regard the origin as fixed or to take it as our starting-point is the same thing. We assume also that there is only one space, or that any point in space is equally accessible from any other. We take for granted the unity of the world common to ourselves and our fellow-creatures. And so far we make an assumption identical with that which we make in the case of time.

We may, as I have said, select an arbitrary origin. We lose nothing in the generality of our results by that first assumption. We have next to assume an arbitrary distance as in time we assume an arbitrary period; and, again, we have as in time to regard this as the measure of all other distances. And here occurs our difficulty. Given an era and a period in time, the other point of time is absolutely fixed. Any other time is given by assigning the ratio of the times; the common measure being some unit regarded ultimately as constant because an identical process would occupy it at any time. We are unable, as has been sufficiently said, to compare times 'in themselves,' that is, as compared irrespectively of the concrete events by which they are occupied. In space we have a similar difficulty, but a different solution. Two equal distances can be compared only by the concrete things which occupy them. They are equal if the same thing which occupies one could, without change in its internal space-relations, occupy the other. The fact that any particular thing is thus constant can only be known by experience. The test, however, of equality or its definition is always the possibility of super-

position; which by the foregoing is precisely equivalent to the statement that the same series of sensations, whatever they may be, would be given to me if my position were altered as is actually given to another person at a different position. Thus, again, in space as in time, we judge of the identity of the thing signified from the sign, supposed to remain the same, and not inversely. I do not directly compare the sensation given to me by the stick in one position and another, and therefore infer that it is the same stick; but I assume it for some other reason to be the same stick, and therefore a sign of potentially identical relations.

I return to the remark already made. We have arbitrarily assumed an origin and a distance. But a point (A) which is at a given distance is not thereby a determinate point. For every sensation of touch or sight is a multiple sensation, implying the coexistence of an indefinite number of points, of which, again, an indefinite number are equally within reach, or identical in respect of distance after making the corrections for variation already explained. This, I take it, is the problem set to us by our sensations; that it is so set, must be taken as a fact not capable of further explanation; and the only question is how we deal with it and what is implied in our method of dealing with it. The definition by distance alone does not define A, but defines it as one of a multitude of A's. And here, again, the selection of any one of these A's is absolutely arbitrary. That is to say, the fundamental assumption of homogeneity implies that I may take any one,—when whatever relations I find to the whole system would be identical with those which I should have found by assuming any other; or, again—which is the same thing—that any one of the A's may be superposed upon any of the others, correlative change of course taking place in them. Whether I state the identity in objective or subjective language, as though the point moved or my determination of the point varied, makes no difference. But now we must proceed a step further. What is to be the common measure of distance? How can we apply it to a system of comparable distances, when we are hampered by this indeterminate element?

Here we are dealing with a familiar difficulty. We cannot define lines and angles apart from each other. An angle is only intelligible as a relation between two lines; and a line must always be defined as having a fixed direction. We can distinguish but cannot separate. At present we are not even entitled to speak of the conceptions of lines and angles. We can only assume the facts given to us and the funda-

mental doctrine of the homogeneity of space. We must suppose, that is, that there are an indefinite number of A's, all of which correspond to an identical distance-value, any one of which may be superposed on any other or taken as the base of our comparisons. To select one is again the same thing as to assume an initial direction. Further, if we suppose a second A (say B) to be determined, it must—since it is still to be a point in the one homogeneous space—have a certain definite distance-relation to the first A. Our assumptions again show that the constancy of this relation means the superposability (without the alteration of any of the mutual relations) of A′B′ upon AB. We must start, therefore, with the assumption that we have an indefinite number of coexistent points, all of which are identical in respect of distance-relation from our assumed origin, and each of which again has to any other a certain relation of distance which is determined when the direction of both is determined and the equality of which is to be tested by super-posability.

But now, in order to compare these relations, we must have a common measure. How are we to measure distance? We cannot compare the distance as we compare a separable quality—a smell or a sound, for example—and pronounce distances to be equal because we recognise their intrinsic identity. All that we have been able to say is that various sensible signals may correspond to an identical distance, and that *if* they do so they are superposable. But we can or must make a further assumption. The uniform element which we suppose to exist implies some real permanent identity, which, whatever else may be said of it, has nothing to do with direction. If I take the whole system of A's which correspond to a fixed distance (a sphere, of course), it must be capable of exactly coinciding with an exactly similar system taken from any other origin. This follows from the assumed homogeneity of space. And further, whatever the principle in virtue of which this coincidence would take place or would not take place, it cannot include any reference to direction—that is, to the principle which determines only the selection of one of the whole system of points. We virtually eliminate the element of direction by taking *all* the directions, and the same process, whatever it may be, must apply in the same way to every origin. Hence, the possibility of superposition depends upon some quality or indicates some identical sensation having no relation whatever to direction.

But we now wish to compare different distances. In one sense the distance of any point from an origin is absolutely

indeterminate. Any point is accessible from any other. Therefore, although we must suppose that any point A is at a given distance in the sense that it is superposable without change in the distance-relation upon a fixed point, we might arrive at it through an indefinite number of points. Any series whatever might be part of a series which ultimately leads us to A, and if we suppose each step in the process to be somehow determinate, we should get an indefinite number of determinants of A. But the question now is how is this determination to be effected? How are we to get rid of the arbitrary term introduced by the identity in distance of an indefinite number of points differing in direction?

Here we come, I think, upon another necessary assumption—on a postulate which we must take for granted in order to correlate our impressions, that is, to interpret our sensations consistently. We have already made an arbitrary assumption of an origin, a distance and a direction—the last assumption being equivalent to the arbitrary selection of one of the equidistant points. We are entitled to do this by the fundamental assumption of the homogeneity of space. This is to say again that from any origin whatever we may find a precisely identical system of relations. But the question now occurs how two such systems are to be compared. The distance corresponds to a something supposed to be fixed, though we cannot define it apart from its signs. But what are we to say of the direction, that is, of the principle of selection among the equidistant points? We should get a precisely similar set of relations if we supposed that *any* direction from you were to be the same as a *given* direction from me. All the other directions would then follow; and your whole system is then superposable upon mine in an indefinite variety of ways. (I get this identity, that is, whether I identify your north with my north or with my south or east.) How then am I to compare directions from different points? I can suppose the *distances* to be superposed, and their coincidence gives the test of equality. The two distances are the same as two smells or sounds are the same. But the difficulty here is that I must compare *directions* on the very supposition that they are not to be superposed. Therefore my method of comparison fails; I should annihilate by applying it the very condition under which the statement is to be valid. The difficulty, in short, arises from the familiar fact that we cannot be in two places at once. It manifests itself in our geometry by the familiar perplexity about parallel straight lines, that is, of lines which are constant in direction although different in position.

At the same time we cannot regard the direction from different origins as independent. We cannot do so, because I have to construct space by annexing your world. I have to appropriate your consciousness or, if we choose to say so, my own at a different position; I have to be in two places at once, or, at least, to reason as if I were in both at once. Suppose, in fact, that I regard any two points A and B as determined relatively to me. Then by my assumption of the unity and homogeneity of space I must also suppose A to be at a given distance from B, and either of them to be determinable from the other out of all points at that distance in virtue of some principle of selection. There is some rule, whatever it may be, in virtue of which we take the particular B out of all the points at a distance BA, that is, fix the direction of B relatively to A. Moreover, since this must *ex hypothesi* be the same from whatever origin I contemplate A and B, it must be something independent of any term involving distance. Or, again, if I suppose identical formulæ to be applied from a fixed origin, I shall get the same formula for the direction or principle of selection of a variety of AB's. Hence, though direction in itself remains as incapable of definition as distance, it follows that direction or distance are independent variables and that the direction must be somehow determinable by a formula which includes no reference to position or, in other words, will be the same for every origin. Thus, though we cannot separate a line from its direction any more than we can separate an event from the time in which it happens, and though direction can only be described as something in virtue of which one point out of a multitude is selected and has then some given distance-relation to every other point, we can say that distances must be comparable independently of direction and origin, and that direction must be regarded as somehow corresponding to a determination equally independent of position, although this cannot be reduced to a direct intuition.

So much, I argue, is imposed upon us by the data from which we start, and the necessity of consistent interpretation. We have now to apply this to the problem of a measure of distance. The unit of distance is arbitrarily assumed when we assume any point A. We can, again, speak of any multiple of this unit; and as a distance may be broken up into subordinate distances (since we may proceed from any point to any other), we may regard it as a sum of equal distances or as measurable in terms of one dimension. But we have still the ambiguity arising from the element of direction.

The position of a point is given if we take any point A at a fixed distance and then determine a particular point at that distance by its direction; and again, there are an indefinite number of possible determinants when we suppose that we reach a point through various series of determined points. Thus we must suppose that any point corresponds to a distance affected in some way by a direction and also to a sum of distances each affected in some way by a direction; and we also know that the distances and the directions are such that their measures are absolutely independent of each other and of position. Again, the *relations* between distances must be independent of the arbitrary unit assumed. We may reckon in yards or miles as we may reckon in days or years, and call any given distance 1 or 100 or $\frac{1}{100}$. And, again, it can make no difference whether we suppose the standard of measurement to vary or the distance itself to vary—whether we speak, that is, in objective or subjective terms. No property of space, that is, no relation between the distances, can depend upon the absolute magnitude. We do not think it necessary to say explicitly in Euclid that the properties of a circle or a triangle are the same whether the side or radius be an inch or a mile. The impossibility of any such dependence upon absolute magnitude is already implied in the assumed homogeneity of space. It is therefore implied that we may suppose distance to vary whilst the direction-factor remains unaltered. That is, that the term corresponding to direction applies now to the doubled or halved distance instead of the original distance. If so, it is implied that the determinants of any point A will equally determine a series of points when the distance varies, so that for every fixed value of the distance there will be a fixed corresponding value of each determinant. So much, I mean to argue, follows from the form of the arithmetical function and the independence of the two variables involved. Since we have assumed that neither of them has any relation to position, nor to each other, we are forced to suppose a distance varying independently of direction, and which will give equal measures of distance for equal variations.

If this be sound (and though I may very likely have expressed myself inaccurately, I think that I am aiming at a sound argument), it follows that in selecting any A out of the equidistant A's I have virtually selected a series of which A may be called the index, and which differ from A solely as at a greater or less distance. A being once assumed, a definite variation in distance must give a definite A′ in the same direction, but at twice or half the distance. But this is

the desired measure of distance. The same series must have been reached if we had started from any other point in the series, for a reciprocal variation would have given the same A. Or, again, we may suppose any other point in the series to be taken as the origin. Any part representing a given distance must be capable of absolutely coinciding with any other part representing the same distance. The homogeneity of space, again, implies that any two points may be thus related. If two points are regarded as fixed (or, what is the same thing, taken as the base of measurement), they must therefore be connected by such a series in which any point is fixed (or determined in regard to them) when its distance is given in terms of a standard distance. If, again, any other point is assumed to preserve all its relations to these points, and therefore to all the points absolutely determined through them, all positions consistent with these relations must be 'symmetrical' with respect to this given series; that is, if it can take a series of positions they must be distinguishable from each other only in virtue of a new arbitrary assumption; or taking any one of them, the same series of relations must give all the others, since otherwise space would not be homogeneous. The series represents length without breadth, for there can be only one point for a given distance: it defines a single direction, which is equivalent to the axiom that there cannot be two lines parallel to a given line, that is, in the same direction, through a given point. That is, we have the properties of a straight line.

Now, as a fact, we seem to find the straight line ready made. We assume in our geometrical reasonings that it has the properties in question, and we start, therefore, from them. This is necessary because, as I have said, we are forced to argue from the sign and not from the thing signified. We only compare distances or directions by superposition, real or imaginary, of the signs, and argue that, *if* unaltered, they must represent the same things. This, however, upon my showing, must represent a previous elaboration by which the intuitive perceptions are made to give harmonious results.

I have, in fact, argued that we really organise space by assuming that any and every point is the index of a line; or that there exists between any two points whatever a relation precisely analogous to the time-relation, although this relation does not fully determine either point from the other, as in the case of time, and consequently requires the assignment of the other element—direction. In both time and space we are comparing our sensations by assuming a common

measure; though, in the case of time, we have a sufficient measure by giving the ratio of one period to another, while in space we have to make the hypothesis that any two points can be related by a precisely analogous measure. The rest follows. We have virtually solved the problem when we have so organised our perceptions as to imply this abstraction. But, of course, we do not at first contemplate the problem in this way. We only learn from the actual solution what were the conditions of successful solution. The psychological problem—how our perceptions come to constitute themselves in this scheme—is therefore an independent question which I certainly am not competent to attack, though I will venture a remark or two upon its general nature.

We interpret a certain system of signs, let us say, as representing a set of fixed relations. This stick or this table is a rigid body in space. In order to think of it as rigid, I have to supply a number of potential relations different from those inferable from the actual sensations at a given time. The signals of sight, for example, suggest certain distances from me of different points, and also certain distances of those points from each other; and when I further assert the body to be rigid, I state that this latter set of distances remains constant. The rigid body is that which preserves the same internal space-relations, and that whether I suppose the body to move or my base of measurement to move. When, therefore, I take a certain varying set of signals to indicate a constant, I have to make certain corrections and to draw a whole set of tacit inferences, which cannot, therefore, be regarded as the immediate product of the sensations themselves. Suppose, for example, that I have a certain visual sensation varying in magnitude. I interpret it to indicate the swing of a pendulum or the rotation of the sails of a windmill as seen from a point in the plane of rotation. I can, as we know, interpret the same signals to mean rotation in either of two directions, or, again, not to mean rotation at all, but the protrusion and retraction of an actual object. That is, for whatever reason, I infer that the actually varying signal corresponds to a potential fixed set of relations, and therefore fixed signals to a varying person. This inference, therefore, supposes a process conducted according to certain pre-established rules, in virtue of which it is made. And, further, if I find in any way that the inference fails, I remodel the potential sensations, instead of assuming the inference to be illogical. My space-perceptions remain, though my interpretation of the particular

phenomenon varies. I reject the hypothesis of rotation; then there must be protrusion. But the protrusion is for some reason regarded as impossible. Then there must be illusion; that is, the experience inconsistent with the geometry is rejected because inconsistent, and is therefore not the source of the geometry.

Yet this is consistent with the hypothesis that in space, as in time, the geometry is the product of the assumption that the sensations must be correlated or that the interpretation must be made on such principles as to secure the correlation. Thus, in the first place, the construction of space must be facilitated by the fact that we have, as in time, a number of empirically given constants. The assumption that my hand or foot is of constant length is suggested and ultimately verified (or approximately verified) through experience like the assumption that the day is a constant in time. And this generally correct assumption must be of essential importance in enabling me to interpret the signals and to read off this and that varying indication as corresponding to the same set of constant potential relations. The problem which we have to solve is thus placed before us in a comparatively simple form, though from the particular case we could not infer the general principle. A more varying set of sensations might have indefinitely increased the difficulty. It might be curious to ask, for example, how long we should have been in working out a coherent set of geometrical conceptions if light did not come in straight lines. Probably the blind might then have been the best geometers. But, in any case, some system of interpretation obviously becomes necessary. We assume, rightly or wrongly, that A is a fixed point relatively to us; say, *e.g.*, the end of the axle of a rotating wheel. Then the assumption that A is part of a rigid body, or that every other point preserves its relations to A and to me, consistently with varying space-relations to other objects, shows that in some way there must be fixed relations between these varying relations, and it must be my problem to interpret them on some fixed system. All I can say, at first sight, is that *if* the signals still signify the same thing they are superposable; and I have to consider what are the conditions of this identity, or how a given change will affect other changes. I may then find that I have tacitly assumed a thing to be fixed which I have yet at the same time supposed to be variable. It is, of course, in exhibiting this superposability that all geometry consists. The measure must be so contrived as to admit of its systematic

and invariable application, and, further, must be the simplest upon which the assumed data can be correlated. I have argued, again, that we proceed by assuming the absolute homogeneity of space, and by then virtually disentangling the complexity arising from the distinction of distance and direction. It is obvious that our attention must be called to the element of direction. From the earliest period of animated life, the importance of recognising variability of direction, for example, is obvious. If we were, like sea-anemones, irrevocably rooted to a simple spot, we might regard the different sensations corresponding to different directions simply as varying though resembling sensations not needing to be correlated at all; but as soon as we say this is the same stick, though it is held horizontally or vertically, we must make an abstraction of the qualities in respect of which it is held to be the same. Our great difficulty, indeed, is to avoid thinking of verticality as something absolute or necessarily having the same direction for every part of the universe, or, in other words, to separate the geometrical relations from the accidental relation of gravitation. As long as we lump the sense of resistance which corresponds to weight with the purely geometrical relation, only occasionally connected with it, we have not got our geometry quite clear. But when we once identify the stick, as the same in size though different in direction, we have made the decisive step towards clearing our perceptions; and we have recognised the fact that the two determinations are independent. Without inquiring, therefore, what are the precise psychological steps involved, or trying the difficult feat of getting back into a pregeometrical frame of mind, we can vaguely surmise the way in which this essential step is or may be forced upon us.

We now have to ask what more is involved in our assumptions. To consider one point as fixed is to consider a series of points as fixed. Any other point which has fixed relations to these points is subject to further conditions through our assumption of the homogeneity of space; and we have next to ask how many indeterminate relations remain, or how many arbitrary assumptions are at our disposal, or, which is the same thing, how many more relations can be represented upon these assumptions.

We started by the perfectly arbitrary selection of an origin and a distance, and the assumption that there may be an indefinite number of points identical in distance and varying in direction. Suppose, then, that we take any two such points. Whatever is true of either, or of its relation to

the other, may be said of the other and its relation to the first. The distinction in virtue of which we call one A and the other B is purely arbitrary, and we might interchange the names without making any difference to the truth of our statements. (We may always argue safely from the fact, that we can see no difference between the cases, or that there is no reason why they should differ to the fact that they do not differ, because we have assumed that there is to be no difference or that we are to 'see' in such a way as to make no difference.) But we have only to consider this relation from another point of view, and to apply the previous considerations to see that it involves another proposition. The two points imply a straight line, and the third point (namely, the origin from which they are equidistant) implies another straight line, which must be absolutely symmetrical with respect to this line. For, we may assume as fixed, or take for a new origin the point in the line joining the two given points which is equally related to both of them. The two directions indicated by them only differ in this, that if either is called positive the other is called negative. The line indicated by the previous origin must also—when regarded from this new origin—have identical relations to these two branches. One might be superposed upon the other, the symmetrical line remaining constant; or every point along that line will have identical relations to equidistant points in positive and negative directions along the other. This is implied, therefore, in our primary assumption as to the mode of measuring the relations in question. Therefore (as, from the homogeneity of space, what is true of one line or point is true of every line or point), we have already implied that a symmetrical line may be drawn from any point in any other line; and if one line is symmetrical to another in this sense, the other line is obviously symmetrical to it.

Supposing, again, that we take any two such lines, we have any point in either of them given by a simple ratio, that is, by its proportion to an arbitrary distance; and, further, any points so taken also represent a fixed line any point of which is determinable in the same way, or, in other words, we have the plane. This is fixed when the two symmetrical lines are fixed, and any point which is in the plane and not in the symmetrical lines is not symmetrical with respect to them, though it will have a corresponding point as we take the negative instead of the positive branch of the other line for its determinant.

Now, as we took the first two points arbitrarily, the ques-

tion remains whether the symmetry of one line to another at a given point is or is not a sufficient determination. Is there only one such line, or may there be many? We know of course, as a matter of fact, that there are many; and I do not see any *a priori* proof, that is, any proof dependent on the assumptions already made, that there can be only one such line. If such a proof could be suggested it would be a *reductio ad absurdum* of my argument. I shall take for granted that it does not exist. I do not see, on the other hand, any proof that there *must* be more such lines than one, except, indeed, from the consideration, whatever it may be worth, that we must push our system as far as it will go, that is to say, until it appears to involve contradictions. Otherwise we should not extract from our method all that it is capable of giving, or, in other words, we shall have no means of determining some relations which are determinable through it. We might, that is, confine ourselves to space of two dimensions, though it is desirable to take into account as many dimensions as are possible. We will suppose, therefore, that if two symmetrical lines be given, the other lines absolutely determinable through them, as above stated, cannot be symmetrical, but that there may be more symmetrical lines than one differing from any of these.

We assume then, as before, a fixed line through a fixed point, both determinations being absolutely arbitrary. Then we suppose a second line symmetrical to the first, which, by the above, is always possible. To suppose again that there are more such lines than one is to suppose many lines, all having identical relations to the first line, or all superposable while it remains constant. But these again taken, all other lines must form a symmetrical system; for, since they all have precisely the same relation to the fixed line, they are not distinguishable in virtue of that relation, that is, in virtue of any assumption yet made. Therefore, if distinguishable, they are distinguishable only in virtue of some property of space—an assumption inconsistent with the homogeneity of space—or, finally, only distinguishable in virtue of another absolutely arbitrary assumption; so that, starting from any one, we get precisely the same series by the same relations. Here, therefore, we may or must make another arbitrary assumption, namely, of one of the symmetrical lines. Taking the fixed line OX and the symmetrical line thus arbitrarily selected OY, we have thus a system of OY's, one of which is arbitrarily taken as fixed. One case of the OY's will of course be that which is represented by inverting the positive and negative determinations; and, as we may start from

either, it is plain that if we may assume any other position than OY we may take an OY (say OZ) symmetrical again with respect to the two branches of OY. We must be able, if we suppose the OY variable at all, to assume that it can generate a system precisely similar to that defined by a fixed OX and OY. The OZ has, that is, a relation to OY identical with that which OY has to OX. It therefore follows necessarily that, if OY be not determined from its symmetry to OX alone, there must be a third axis OZ which, by the mode in which we have reached it, is symmetrical both with respect to OX and to OY. It is also symmetrical with respect to all the points determined absolutely through OX and OY, or to the plane XY, for the identity of the relations of the positive and negative branches apply equally to all the points determined through OX and OY alone, as the new factors are dependent solely upon these terms; and similarly OX is symmetrical with respect to it as it is symmetrical with respect to every one of its positions, and OY again with respect to OX and OZ. Further, *if* OZ is supposed fixed, we now have all the points dependent upon, or determinable through, the three axes equally determined.

The only question is whether OZ is fixed, or whether we have still an arbitrary element at our disposal. If so, we should have again to apply precisely the same reasoning as before. Taking any OZ corresponding to the given conditions, and supposing that there were many OZ's all fulfilling the same conditions, and then arbitrarily selecting one of them, it follows as before, that, since every particular OZ has these relations and is therefore absolutely independent of them, we must have another OZ, say OW, symmetrical with respect to OZ. But OZ is defined as the line (or a line) symmetrical with respect to OX and OY. We have therefore to suppose a line symmetrical with respect to all three axes, and we have shown that a line symmetrical with respect to any two, say OX, OY, is necessarily different from the line symmetrical with respect to two others, OY and OZ; in fact, it is not identical with it but symmetrical with respect to it. Therefore we are attempting an impossibility already excluded by our assumptions. When we took any two symmetrical lines, OX and OY, OX was symmetrical with respect to OY, and OY with respect to OX, or the relation was absolutely reciprocal. When we introduce a third, any two give the other, and we find a fourth symmetrical with respect to all these to be an impossibility, or to correspond to contradictory determina-

tions. Hence we have exhausted the resources of our method when we have reached the three dimensions.

This, of course, does not represent our actual logic, but represents the conditions virtually implied in our mode of reasoning. We have first assumed the homogeneity of space, and then, to meet the difficulty arising from the non-determination of a point by a simple assignment of distance, we have assumed that any two points are measurable by a method identical with that employed in the case of time; and have finally become conscious of the limits virtually imposed by the assumption. I admire my own audacity in thinking as if I really believed in my own reasoning, but I cannot help fancying that it may be possible for some better qualified person to work out the problem more successfully. The result would, I think, be to the following effect. I have tried to show what is the logic by following an actual line of reasoning, and endeavouring to assign the general principle in virtue of which it is valid. I observed at starting that we could obtain necessary truths in regard to certain empirical propositions, those of genealogy for example, when the general truths of arithmetic are applicable in virtue of our assumptions to certain particular cases. Thus we find that the genealogical problem comes simply to a case of counting the number of descents from common ancestors, the required data being implied by the statement under consideration. Such a process is much easier when we take the particular case instead of dealing with the abstract formulæ; and there is always a corresponding difficulty in discriminating the general principle from the particular set of facts in which it is imbedded. This is certainly very great in the case of geometry. The abstract principle would not by itself suggest the particular case. I, at least, can only satisfy myself, or seem to satisfy myself, that it does apply by following out the particular application; and there is a constant danger in starting from the other end of assuming the very point to be proved, and attributing the necessity to the familiar empirical truth instead of to the general abstract principle which it is so difficult to grasp by itself. At some point geometrical problems come under the head of algebra, or can be treated as simple arithmetical relations. The question is, What are the assumptions which justify this, or at what point does it become possible.

I have tried to suggest that the geometrical axioms emerge under the necessity of correlating our various impressions, and, therefore, by the help of certain assumptions. According

to my view, they are not simple empirical truths, detected by observation and conceivably different, inasmuch as they already imply a certain system of comparison and the dismissal of observations which conflict with that system. Nor, on the other hand, do I consider them to be the result of a form arbitrarily imposed upon the sense-given symbols; for, as I have argued, they have emerged through the necessity of combining those signals upon definite and consistent principles. It is conceivable that we might have a simpler system of comparison which would be adequate for a simpler set of sensations; or, again, that although the sense-perceptions are, as a fact, unique,[1] we might have an entirely different set of sensations, which would be comparable by a precisely similar method, as, for example, by a possible elaboration of the other senses; or, finally, that we might have a more complex system of sensations which could not be adequately compared by this method. When in fact we have to deal with physical problems, involving higher functions of the variables, we do not construct a new system of comparison or a space of more dimensions, but are content to use the old space, only stating the new law of variation in terms of the old, and dispensing with any attempt to form a corresponding intuition. I am, however, in danger of getting beyond my depth, and am finally content to submit my arguments for what they may be worth.

[1] They are probably unique *because* it is convenient to reduce all our modes of comparison to a single system.

III.—A SWEDENBORGIAN VIEW OF THE PROBLEM OF PHILOSOPHY.

By WILLIAM DENOVAN.

SWEDENBORG'S peculiar phraseology, voluminousness and (what Kant called) "dreams of a ghost-seer," have conspired to render his position in the history of the human mind virtually unknown to the world. To the student there is here a loss which ought not to continue, whatever difference of opinion there may be as to Swedenborg's mental condition. A system which interested Kant, Schelling,[1] Coleridge and Emerson must be admitted to possess some intrinsic value, and a brief application of its principles to the main problem of philosophy should not be unwelcome. Swedenborg, though a systematic writer, was not in the way of laying down the conditions of a problem and from admissible postulates working logically to legitimate conclusions; each of his works consists simply of a concatenation of affirmations which, when taken altogether, form a symmetrical whole. Brief summaries of his main affirmations in his own terminology, which contains in many cases an unusual meaning, are not uncommon; but the essential element of progress or discovery involved in his principles as postulates for investigation, or in their application to the solution of problems in moral and intellectual philosophy, has, so far, been ignored. The writer here takes as a test of their value their application to the question:—Can we conceive of any possible mode of knowledge concerning a basis outside of consciousness for the facts within it; and, if so, what is that outside of consciousness which appears within it as object?

Of course, the fundamental postulates of any philosophy are incapable of being demonstrated in the same sense as deductions which are logically drawn from postulates already accepted as valid. It is equally an assumption to say that there is no world external to consciousness as to say that there is. In either case we can only perceive the manifesta-

[1] The writer has been informed that Schelling, at a late period of his life, upon being shown a volume embodying a portion of Swedenborg's system (*Fundamentalphilosophie*, by Prof. J. F. J. Tafel, Bd. i., the only volume ever published), was so struck with it that he told its author that he was on the right track to the true philosophy.

tion of it as it exists in consciousness. All that can be justly demanded of any philosophy is, that the fundamental principles laid down shall have their root in universal experience, shall not only be impregnable against all logical assault, but be in every direction capable of extended application and exhibit constant fruitfulness in the realm of explication. The problem then is to show either how the mind can evolve from itself the manifestation of an external world without violating the common sense of mankind, or to show how a world external to consciousness can hold such relationship with the conscious subject that cognition is possible, and if so to understand what that is which is noümenal.

Here, however, it is requisite to note the fact that there are discrete degrees of manifestation in the object without involving any breach of continuity from that which underlies all its manifestations, and that consequently there are discrete degrees of perception by the mind without breaking the unity of consciousness. For instance, we may note sense-perception which man has in common with the lower animals. By this he perceives phenomena such as the apparent motions of the heavenly bodies. A platform above mere animal perception, which simply gives truths in their relation to mere sense, leads man to the discovery of the true system of astronomy, and exposes the fallaciousness of mere sensuous appearance. This higher plane of perception makes manifest that which we may style *relatively noümenal*—or real when considered in its relation to that which outwardly appears to the senses. In a still higher degree a man may perceive what underlies the appearances of absolute motions, spaces and times. But even this latter can in nowise be considered the *absolute* truth, for this again must transcend the perception of all but an Absolute Intelligence. Perception may stop at either degree, but he whose perception is more interior or higher comes nearer to the cognisance of truth in its absolute sense, *i.e.*, has mentally a truer *representation* of it.

It is evident, then, that the truth involving subject-object upon any one plane becomes error to man if he takes it to be ultimate, absolute or final. Whilst it is true that the intelligence is so far limited that absolute truth is incomprehensible, it is no less true that it is impossible to define the limits of comprehensibility, or to mark out the boundary line dividing the absolute from the relative. We may indeed provisionally speak of an absolute space and time in noting what we call the real and apparent motions

in space, but it will be only correct to look upon the so-called real motions as negatively noümenal to the merely sensuous region of the mind; becoming positive when known in the higher region of the intelligence, but not absolute in the sense of self-subsistence. It would be dogmatic to affirm that our knowledge of these so-called real motions mark out for us the limits of the knowable. All questions, however, which the mind can fairly ask by not involving the infinite and the absolute, can as fairly be expected to have answers to them furnished which will be satisfactory to that plane of the intelligence which questions.

But whilst Absolute Being such as it is in itself cannot be known, the fact remains that there is Self-existent Being, and also that which is relative and finite; the latter having its being in and from the former. We do not go outside of our consciousness in the affirmation that the Absolute exists; for it attests its own existence to everyone in the very idea of it. The fact that the individual consciousness had a beginning is a plain matter of experience; and this fact, with all that it implies, must not be omitted from our cognisance of the contents of the mind. Nor is philosophy possible where it does not supply the main factor; for then we sever ourselves from the source of all knowledge. As the Absolute is to be considered identical with the Infinite, it follows that it both underlies the finite intelligence and is beyond its range; and indeed it is because the Absolute underlies the relativity of consciousness that the mind becomes aware of the existence of that Absolute Being to which it is related. We therefore do not transcend consciousness in the affirmation of an Absolute which exists independently and above it. But this very affirmation contains within itself the negation in the Absolute of such imperfect appearance as must necessarily be looked for in its representation to a consciousness derived and finite. Still the recognition of this fact corrects all necessary imperfection of our mental conditioning.

In treating of the relationship between the Infinite and the finite, all attempts to reason from the standpoint of the Infinite or Absolute are inadmissible, because where the Infinite is, finite intelligence cannot be. We cannot reasonably maintain absolute Thought and Being to be identical, when the only thought and being apprehended by us are relative and finite. It cannot be said that finite thought and Infinite Being are identical, or that the one ever passes over into the other, without plainly violating all experience. Still, as the relationship exists, intelligible answers to all questions

involving only relativity and finitude, or of the relationship to the Infinite as seen from the finite side and on the level of human intelligence ought fairly to be looked for; but no more, as this would involve the absurdity of expecting an explanation upon a plane of intelligence above natural reason.

But as infinite or absolute truth, such as it is *in itself*, cannot be known, it follows that, in order that there should not be utter nescience concerning it, perception transmitted from an Absolute Intelligence in representation, and imaged upon the level of human intelligence, would become the fundamental truth concerning it, to man; provided he recognises the fact that what to him is the absolute as conditioned by his own thought is simply a qualitative reflection of the real Absolute, but still sufficient for his side of the relationship. It is thus fully conceded that, in one sense, "what is called the Absolute is only the Relative under another name". But the Absolute reflected in that *relative* is the true Absolute, and is the One using this relative idea of Absoluteness as the bond of relationship to .be witnessed from the side of human perception. Now, if we take the Absolute in all its fulness as given in *our* consciousness we *humanise* it, and it becomes to us an Absolute Humanity; and this, as a postulate, must be universally acknowledged to be as admissible as to postulate it as pure Thought, or as Matter, or even to say that it is altogether unknowable. Thus all ideas concerning the Absolute resolve themselves into this—that it is either as to will and intelligence human, or is different from the mind which contemplates it, and which was and is derived from it. If, however, we are willing to postulate the Absolute as a Personal God in comparison to whom our own personality is the merest shadow, the aspect of our relationship to Him becomes—that He has made the mind which can contemplate Him in his own image, and according to the condition of that image becomes Himself represented in it. There is no low anthropomorphism in this. To attribute will and intelligence to God, as absolutely perfect as we can conceive them to be, and also to acknowledge that they in Him transcend our conception, is not to deny that "His ways are not as our ways, nor His thoughts as our thoughts"; but rather they imply it in a sense in which every rational Theist would have it understood, that is, as transcendently human; the anthropomorphical aspect being to man the truest representation, or *covering* of his real Being to human perception. That limited personality or consciousness which is necessarily involved in our definitions of them or in our conception of

God is therefore the result of defective or imperfect perception, but the defect is remedied as soon as acknowledged. To say that the Absolute is "above personality" is to say that it is above the exercise of love or wisdom; and this is an evident violation of all reason. It is true that a God known fully and absolutely "would be no God at all"; but it is also true that a God who, if He willed, could not be fully known as representatively mirrored in human will and intelligence, would be no God at all.

We see, then, that if we attribute in absoluteness to the Absolute that which we find manifest in what is derived, we of necessity conceive the Absolute as a Personal God exercising both will and intelligence. This implies design, purpose or use, overruling all manifestations in space and time. But as there is with God absolute freedom, so in the animation of a created organic form the derivation of relative freedom in the form animated will follow. This freedom of directing the course of the life which animates or flows into man is in conformity with universal experience; though absolute autonomy, or the power of originating effort, is both inconceivable and inconsistent with the principle of the Conservation of Energy. Still, this freedom implies the granting of power to man to deflect the course of Divine purpose, and consequently to produce much in the world which was never designed by the Creator. The very fact of the exercise of purpose by the finite mind implies the permitted possibility of producing deviations from the direct lines of purpose in the Absolute Mind; yet at the same time an absolute law of order overruling all deviations, which is not so manifest. The possibility of evil is thus a necessary consequence of the exercise of freedom by the individual, even whilst animated by an Absolute Life all good; especially if such perversion of good be looked upon as increasing hereditarily through successive generations. Involuntary evils, or so-called accidents, are also, of course, not of Divine origin in the usual sense of *purpose*, but this does not imply that they are independent of a designed law of order absolutely good, the operation of which reaches through pernicious influences to the particular no less than the general. It is a matter of universal experience that the results of our endeavours are at times in exact conformity with our intentions; that at times they very imperfectly fulfil our designs; and again, that at times the results are altogether opposite. This follows analogically from our postulates: a human experience which is an image of the Divine-Human experience; the Absolute Will operating as best it can without violating the bestowed freedom of created wills.

There is, then, something which precedes and produces consciousness; and this, therefore, should be our starting-point. The laws of identity and contradiction which are only relative to us, are to be held absolute with the Absolute. Non-being is the absolutely opposite of Absolute Being; even as being and non-being are relatively opposite in finite thought. That which is opposed to our true nature is to us relatively evil; and that which is in harmony with our being is to us relatively good. The deduction cannot, therefore, be logically evaded that that which is in harmony with an unchangeable Absolute Being is unalterable absolute Good, and that all evil is of necessity the absolutely opposite of the true nature of God. Evil as an existing fact is thus good perverted in and to those who abuse their relative freedom.

We may here note that there are two kinds of opposites derived from, without existing in, the Absolute, because absolutely opposite to his nature; and this consistently intelligible to human reason. One kind is that which arises from the perversion of that which flows from the Absolute, so that the quality is altogether contrary; as when, by the abuse of human freedom, good or love for others becomes evil or selfishness; or as when truth becomes falsified. The other kind is the result of mere privation, as when darkness and cold results from the deprivation of heat and light; or as when an organism becomes dead when deprived of vitality. Death has thus two senses as being the opposite of life—the latter-mentioned species of opposites implying *natural* life and death; and the former, which is often used by theologians, *spiritual* life and death. The case is similar with spiritual heat and light, the opposites of which are respectively, in *perversion*, unholy fire and a false light in which truths appear false and falsities truths; and, in *deprivation*, spiritual cold or lack of feeling and the darkness of ignorance. Here the *becoming*, according to which opposites are related, becomes intelligible; for the Unity from whence all opposites are produced can be plainly perceived without making that which is contrary to reason the same thing as that which is not contrary, as the Hegelians do. Individuality, distinction or differentiation descends connectedly from the Absolute One from whom come all phenomena; and thus our perceptions of both unity and difference come in the universal flux of vital force from Him, producing that universal Sense or Reason by which the individual mind becomes capable of cognising the nature of the sensation of another without sinking its own consciousness into that of the other.

The true starting-point of investigation into the nature of subject and object must be a postulate which is consistent with universal experience as to their production in consciousness; for consciousness affirms the existence of something before itself, and which sustains it. Ours may be thus expressed:—Consciousness is the result of organic growth and modification, products of two factors operated by and under the guidance of God: (1) Formative or structural forces operating organically as from within outward; and (2) passive co-operation by external pressures and sustenance. In other words, Absolute Intelligence is the source of all finite knowledge, and it comes with a formative, animating force operating from the most interior root of each individual being. This, by combining with forces of environment pressing upon it, develops an organised form, and creates the world of phenomena in every mind by organic modification. The resultant individual mind becomes aware of the existence of both factors concerned in its production by the inflowing Life *in-forming* it, during the exercise of both means in the awaking of consciousness, and in the sustentation of those correspondent bases of reaction which externally appear as phenomena.

The law of the equality of action and reaction has been proved by experience to be operative in the production of all effects. The postulate, then, of this two-fold operation by Divine power in the production of phenomena will be in conformity with law as we know it.[1] It follows, therefore, that the creation and subsistence of everything, throughout all changes, result from the action of structural forces and of equable pressures upon them reacting in unison; both being equally necessary, as the acting forces would otherwise dissipate.

Creation thus becomes an act in itself distinct from the Creator; and not a mere modification of his substance. For all created objects could not then be considered absolute substance; they would only have Absolute Substance for their support. If we conceive finite intelligence to be an evolved product of such two-fold operation in the creative

[1] "In everything created by God there is reaction. In life alone there is action, and the reaction is excited by the action of life. This reaction appears as if it belonged to the created subject, from the fact that it exists when the subject is acted upon" (Swedenborg's *Angelic Wisdom*, No. 68).

"Causes do not produce effects by continuity, but by discreteness. The distinction between the two is as between the thing that forms and the thing that is formed" (*Angelic Wisdom*, 185).

work of organisation, we should have a manifestation of phenomenal life such as all experience gives; and still it is distinct from that self-existent Life which produced and sustains it. To such a derived intelligence created objects would be *relatively substantial.* The produced consciousness would be a derivation, but not a severance from, nor yet a modification of, that indivisible Life which had no beginning.

Had Berkeley recognised this reactive basis for the production and percipiency of the external world, his purpose would have been achieved. Vulgar realism or an absolute dualism of mind and matter would have been avoided, although an objective ground of independent reality would have remained. "Common Sense" would not have been set aside; for the groundwork of our sensations would still exist independently of us. And our understanding of what it is, apart from the sensations themselves, might have been looked upon as possible; for an actual relation would be seen to exist between subject and object, which is altogether lacking in the philosophy of Kant.

Whilst, therefore, all cognition is referred to the Divine Agency, there is no mystical or hyperphysical evasion of the problem, because it is intelligently involved in the known facts of organisation. Mere unorganised matter gives no manifestation of either will or intelligence; and we cannot, therefore, refer the derived intelligence manifested by organic forms to it as a Source; but we can refer to it as the starting-point of organisation and growth, for this is given in experience.

In self-consciousness the Ego does not lose its subjectivity in making itself object, self being simply the object chosen to the exclusion of any other, for objectivity is the necessary correlative opposite of subjectivity. That which is present in thought with the Ego, is that which is its past in the memory—that which has been modified by former experience being contemplated whilst undergoing further modification during reflection.

Mind and matter are thus not so incompatible as has been supposed; a perfectly intelligible relation existing between them. Phenomena are the passive manifestations of unseen activities which form them,—forms which are but the clothing to sense of underlying potencies and qualities, physical and vital, of which time and space cannot be predicated, but which we know have moulded them. In other words, *uses,* actual or potential, good or evil, are the noümena of which all apparent substances and forms are the phenomena. Matter may then be defined as the created groundwork to so

receive the Divine Life that finite mind can be produced and manifested or clothed by it; and without which the stream of vitality would constantly dissipate for lack of a vessel as its containant. In order, for instance, for mental passions to be seen, they require to be manifested on the face of a body appearing in time and space. The mind can only conceive of *uses* according to their potencies or qualities as embodied in forms which exist in time and space; and objects must, therefore, appear as existing in time and space, although time and space cannot be predicated of the uses they embody.[1]

A clear idea of that which constitutes substance as distinguished from that which apparently constitutes it, is necessary here. That in which reality becomes enveloped by forces of reaction, and which mirrors or reveals it by embodiment, appears to the senses as substantial; whilst the active cause remains hidden as if unsubstantial. For instance, the mind appears to be unsubstantial, and the body substantial, because the mind is brought forth to view by its means. Matter, with space and time, appear to be absolute realities, and God unsubstantial, without room in the universe for Him. But God is the only Absolute Substance who created matter, time and space, which are simply images of His absoluteness, eternity and infinity—different, indeed, yet giving symbolically positive knowledge of Him. Nor is there any violation of common sense or experience in this. Light and heat only become manifest when their activity is resisted or reacted upon. Yet, undoubtedly, without an envelopment no reality could become manifest. Only we must not invert truth by supposing that which is the effect to be the cause—the envelopment or means by which the reality becomes manifest to be that which it embodies.

Moreover, there are words that are applied to both mind and matter, the manifestations of which are totally different, and yet which are seen to be correspondently applicable; such as mental heat and the heat of molecular motion; intellectual light by which the "mind's eye" sees, and natural light by which the bodily eye sees. We also speak of *breadth* and *depth* of thought as naturally as we apply the

[1] "The things which are of space are predicated of the terraqueous globe viewed in itself; and the things which are of time are predicated of rotation and progression; the latter also make times, and the former make spaces; and they are thus presented from the senses in the perception of reflecting minds. But in God there is nothing of space and time; and yet the beginnings of these are from God" (Swedenborg's *Universal Theology*, No. 31).

same terms to matter, and similarly in very many cases. In this sense, mind has extensiveness and solidity no less than matter,—it extends and measures what is extended, inert and measurable.[1] If in all this there is the fact of a primordial sameness in the qualities of mind and the properties of matter, so that both are simply the active and the passive aspects of the same groundwork from whence finite consciousness is produced, the subject mind knows something not alien to itself in objective cognition.

Nor is all this mere metaphor, as will become evident the moment we put forth a definition of such words as *smile* or *frown*. Here are feelings made materially visible. The organs of the body co-respond to the mental functions which actuate them; the former admit of severance because the latter have embodied their particular modes of activity in them, which may operate separately, or not at all; but yet the whole body is the manifestation in place to sense of what the whole mind is to non-spatial perception. Indeed, Swedenborg himself maintains that the mind would dissipate with the dissolution of the body, were there not, as Paul says, a spiritual body not subject to dissolution as well as the natural body which is. Swedenborg knew well enough that no man could think without brains, or live except in a body, but at the same time he held that man could think spiritually, *i.e.*, of God, immortality, &c., and that it took brains composed of spirit-stuff to enable him to do it; because matter is only applicable to the world of present sensation. Herein lies the difference between man and the lower animals. So far as the world of matter is concerned, reason as well as instinct differ only in degree and natural application. But there is a mode of intelligence, open or latent, in all men of average sanity, even the lowest savages, which is eternally above and beyond the highest intelligence of animals. This is the universally human perception of *correspondence*. The savage who illustrated the conduct of one British official by holding up a *straight* piece of wood, and the policy of another by holding up a stick that was *crooked*, knew that he was not misunderstood.[2]

[1] "When anything derived from a spiritual principle as its origin and cause becomes visible and perceptible before the senses, in this case there is correspondence between them" (*Divine Wisdom*).

"Correspondence is the appearance of the internal in the external, and its representation therein" (*Arcana*, 5423).

[2] "The spiritual things with which natural things correspond assume another appearance in nature, so that they are not distinguished, but seem incongruous and irrelative" (*Arcana*, No. 1887).

There is, then, a world of impressing forces outside of us which manifests itself as the world of phenomena in consciousness. It is a dead passive vessel by which that which appertains to mind, more or less vitalised, clothes and reveals itself; even as the arbitrary printed forms upon this paper clothe principles that are not in time or space, rendering them perceivable by men who bodily are, and who have agreed to certain modes of transposing them in *correspondence* to variations of meaning intended to be conveyed. But this implies that the groundwork of the impressions produced upon us lies altogether outside of ourselves individually. Nor can anyone dispute the fact that we do not require to step outside of consciousness to get at the knowledge of things outside of ourselves, if an Absolute Intelligence who is both within us and without us, in the very act of making us conscious, does so by sending intelligibly a stream of His knowledge of what is without us into us during organic growth and modification.

The flux from within brings to the consciousness fundamental truths in its passage to its meeting there with the stream of reaction. The external element in the excitation of sensation, if looked upon as being all, gives us sensualism or positivism in philosophy. If the flow from within be supposed all, we have mysticism or idealism. Both taken together attest the truths of the common sense and fundamental beliefs of mankind. If, however, it can be demonstrated that it is unreasonable to hold that in organic modification a flux of Self-existent Life operating as from within can originate finite perception or consciousness, or cause the manifestation of a universe by means of correspondent impressions reacting in a manner to produce the sensation of externality; or if it can be shown that, whilst such universal inflowing Intelligence may fairly be assumed to be the cause of sensibility to external impressions in the finite subject, it can never keep carrying into a recipient consciousness the knowledge of what was before, and is outside of it;—then the dilemma in which Hume placed philosophy still remains.

In justice to Swedenborg, but still more to the unbiassed reader, a word ought here to be said in regard to our philosopher's statements concerning the spirit-world, and their claim to notice by the philosophic mind. There is one line of argument in support of his affirmations which Kant did not see, in his bewilderment, whilst virtually forced to give his opinion concerning Swedenborg's claim. Sweden-

borg's alleged experiences of the spirit-world give in detail the actualisation of that which lies latent in universal experience in this world; and the possibility is shown of how a change of subject *plus* object can occur without loss of personal consciousness to the individual, or alteration of the nature of that consciousness during subjective change. Here he stands alone in the history of religion and philosophy.

Of presumption and conceit Swedenborg must be acquitted; for his doctrine of *passivity*, according to which man originates nothing, makes all claim of merit an attempted theft from God. Indeed, were he alive now, the title of this article would have greatly annoyed him, and for 'Swedenborgian' he would have substituted 'Neo-Christian'—the term implying a new unveiling of Christian truth. In fact, according to him, the words 'Christianity' and 'Truth' are synonymous, whatever the aspect of the latter in any portion of space or time. He believed himself to be the commissioned revelator of a true *Metaphysics*, or science of Mind (including a concrete world of spirit), as connected with the realm of *Physics*. The highest stage of his revelation might be denominated *Theophysics*, or the science of Divine purpose in creation. And he looked forward to the time when the inseparable connexion of these three would be seen as "a blessing in the midst of the land". In deference to human freedom, however, he was to be deemed crazed by those who, had he written otherwise than he did, might have been "convinced against their will". His revelation, therefore, he believed to come upon the time when sensible men would call no finite man master, but would claim the right to have truth made perceptible to their reason before they be asked to admit it: "thinking from others" being his definition of human stupidity; the exercise of "freedom according to reason" being his definition of manhood.

In order that a described spirit-world should merit notice as a possible fact, not only ought it to be the exclusive one suggested in universal experience, but also there should be no valid *a priori* reason possible why, according to the known constitution of the human mind, the present world of sensation should exist rather than it. No sound reason can be given for maintaining that the existence of the present world negates a possible change from one into the other except upon the condition of violating the internal conditions of our present consciousness.

The world manifest in sensible experience is known in so

far as it conforms to the laws of the mind. In this its reality as an objective world is given. Yet still its resistance to the operations of the will and understanding is also experienced universally. As a consequence, we find that the individual mind must conform to an external order in nature; and in so far as it does not do so, the mind itself is disordered. Suppose, however, the potency of the will to be so far increased that its operations took effect upon external objects, including the body itself; or, rather, suppose a world of phenomena similar to the present, but offering no resistance to effluent mental action; so that all objects would become instantaneously plastic to subjective conditions. Here degradation in the subject would imply correspondent degradation in objectivity by the surroundings conforming to the constitution or character of each individual percipient, and be to him the only real world. By the Non-ego's changing correspondently with the desire and condition of the Ego, all the obstructions offered here by a fixed and measurable space and time would be there non-existent; for the spiritual body would overleap them, as the mind alone can do here. Still, their forms would remain, for appearances in space and time are necessary to thought; but space and time would appear longer or shorter according to changes in the individual mental states. Similar minds would draw together through sympathy, and withdraw from those that are unlike or antipathetic, and so would blend together their surroundings, giving a uniform character to the objective conditions of aggregated bodies of men. Individual reformation would be impossible, for there would be no truer order manifest to the percipient outside of himself than the condition of his own mind. Even hypocrisy would become impossible, for its motive would be taken away; and, indeed, the plastic condition of the very substance of the body or face would of necessity reveal at once the state of the mind which it clothes and organically expresses.

Now, such a world as this is only hindered from coming into actuality here by the obstructing laws and forces governing that inert ground from which is produced the world of natural phenomena; and it is therefore more really conformable to the internal condition of the mind. It is also evident that it would manifest itself according to orderly laws no less than the world of present experience, although the order would be somewhat different; for the laws of mental attractions and repulsions would be made those of the objective world, and of individual consociation. However

utterly such a world may be thrown aside as a fancy, the constant effort with everyone to produce it cannot be divorced from his world of present experience.

To accept, then, as a matter of faith the reality of a world of completed effort for man, with a corresponding internal embodiment suitable for his existence upon it; and this in conjunction with our material embodiment in *its* present world of sensation, is not unphilosophical when none of us can deny our constant endeavour to overcome the barriers of space and time, and to make matter plastic to our will. Indeed, physical science in its onward march is simply endeavouring to realise *here*, so far as it can by invention, the world which we are describing. Conceive, then, an objective world on which all men who have ever lived and died consciously exist, the surroundings of each being in correspondence with his character or tendencies, and where mental attractions and repulsions operate by consociation and separation,—and we have there the spirit-world as Swedenborg depicts it.

IV.—RESEARCH.

MENTAL ASSOCIATION INVESTIGATED BY EXPERIMENT.

By J. McK. Cattell, Prof. of Psychology, Univ. of Pennsylvania, and Sophie Bryant, D.Sc.

Mental Association has always interested students of psychology. The importance of studying the train of ideas is everywhere admitted, and by the English school association has been put forward as an explanation of mental phenomena. We may, therefore, be glad that it has recently been found possible to investigate the subject by scientific experiment. During the past ten years such research has been undertaken both in England and in Germany,[1] and of this our present work is a continuation.

1. Methods of Experiment.

Most of our experiments were made in a way so simple that they may be repeated by anyone. A spoken or printed word was given to an observer (or 'subject'), who was required to say or write as quickly as possible what it suggested. The experiment thus began with the perceiving and ended with the expressing of a word. The intervening mental process is an association, the name being here taken in a wide signification. We used 20 nouns (given in Table V.) with about 500 observers, and 250 or more words with 6 observers. We thus have a large mass of material which we shall consider in regard to (1) the time taken up in the process and (2) the nature of the association.

The time it takes for one idea to suggest another is of scientific and practical interest. It was also of advantage in a first series of experiments to get the observer to give the associated idea as quickly as possible in order to obtain uniformity. Three methods were used to measure the times. (*a*) In the first series of experiments, made by C. at Leipsic (1885) with the help of Dr. Berger, apparatus[2] was employed which made it possible to measure to the thousandth of a second the time of each association. Such elaborate methods could not, however, be conveniently used with a large number of persons, nor was it necessary to measure so exactly the time. (*b*) We therefore (1885-8) prepared lists

[1] Galton, *Inquiries into Human Faculty*, 182 ff., and *Brain*, 1879, 149 ff.; cp. Mind iv. 551. Wundt, *Physiologische Psychologie*, 3rd ed., 312 ff., 364 ff. Trautscholdt, *Philosophische Studien*, i. 213 ff. Kraepelin, *Tageblatt der Naturforscherversammlung zu Strassburg*, 1885. Cattell, Mind xii. 68 ff.; *Phil. Stud.*, iv. 241 ff. For an account of theories concerning the "Association of Ideas," with references, see Croom Robertson in *Encyc. Britannica*, 9th ed., ii. 730 ff.

[2] For description, see Cattell, Mind xi. 220 ff.

containing 10 words, and the observer seeing the words in order said what each of them suggested, the total time for the 10 processes being taken. The average time of association could thus be obtained with sufficient accuracy, but not the time for the separate processes. We were able, however, to get the times for different classes of associations by using lists made up of concrete nouns, abstract nouns, verbs, &c. (*c*) In a third series of experiments, made mostly by B. (1887-8), a method was used that admitted of a number of persons being tested simultaneously. A word was distinctly spoken, and the observers were required to write in the order suggested as many words as they could until they were stopped after 20 secs. In this case the number of ideas suggested was complicated by the need of writing them down, but the results seem to show that the number of ideas was limited, not by the rate of writing, but by the rate of thought.

While three different methods were used to measure the times, the process of association in the several sets only differed in so far as in the first two sets the starting-word was read and the suggested word spoken, whereas in the third set the former was heard and the latter written. In this third series of experiments we have the train of ideas for 20 secs., and this is in some ways more interesting than the first idea suggested. This latter, however, presents the simpler problem, and gives as much material as can be conveniently considered in the present paper. We may at some future time have experiments on the train of ideas, and we hope that others will also undertake research in this direction.

2. The Time taken up in Mental Association.

The times we obtained in our experiments do not give merely the duration of the process of association, but include the time required to perceive the original words, and to say or write the suggested ideas. The time, if any, taken up with intermediate ideas which are not expressed in definite words must be considered as part of the association-time. In the cases where the duration of a series of processes was measured, it is not possible to eliminate with any exactness the perception-and movement-times. This is due to the overlapping of the processes; an association may be going on while the foregoing idea is being expressed or the following word is being perceived. Experiments, however, show[1] that it takes on the average about $\frac{1}{2}$ sec. to see and name a word; so if this interval be subtracted from the whole time we get approximately the duration of the association. In comparing the time required by different persons and classes of persons the whole interval may be used, the perception-and-movement-time being short as compared with the association-time, and in a general way proportionate to it.

[1] Cattell, Mind xi. 63 ff.; 530 ff.

(*a*) In the first series of experiments, it was possible to eliminate the perception-and-movement-time, and thus to determine with great accuracy the association-time. This is given in thousandths of a second in the following Table. There is also given after the average time the mean variation of the different measurements. 52 words of each class were used, German for Dr. Berger, English for C.

TABLE I. *Time of Association.*

	Concrete Nouns.	Less Concrete.[1]	Abstract Nouns.	Verbs.
Bg. ...	361 (73) ...	540 (168) ...	633 (188) ...	538 (184)
C. ...	380 (108) ...	384 (108) ...	508 (171) ...	465 (144)

The time of association was thus in the neighbourhood of $\frac{1}{2}$ sec. It will be noticed that the time was longer (Bg. 272, C. 128σ) when the given noun was abstract than when it was concrete. This is an interesting fact supported by all our experiments. The time of association with verbs was between that for concrete and abstract nouns. According to this method, in all, 832 associations were made by C., about half of them on new words, the other half on words which had already been used. The average time of association was 475σ, a little less than $\frac{1}{2}$ sec. The mean variation of the different associations from the series in which they were made was 134σ, nearly $\frac{1}{7}$ sec. If difficult and unusual associations are omitted by dropping the 6 most irregular times from each series of 26, the average time becomes 431σ, the mean variation 69σ. Thus the usual time required by C. to form an association such as we are here considering is somewhat less than $\frac{1}{2}$ sec., and does not vary greatly from time to time. The longest associations were *deliverance-hope* (1453), *cut-knife* (1085), and *civilisation-wilderness* (1064); the quickest *good-bad* (111), *father-mother* (132), and *life-death* (143). With these latter it will be noticed that the relation between the two ideas is so close that the association follows almost as a matter of course.

(*b*) In our second series of experiments associations were made by B. and C. on 500 words. Of these words 250 were concrete nouns, 100 abstract nouns, 50 proper nouns, 50 verbs, and 50 adjectives. Associations with the concrete and abstract nouns were also made by Mr. Stout, and with the concrete nouns by Mr. Edgeworth and Miss Hughes. We further selected 10 abstract and 10 concrete nouns (given in Table V.), and used these with 17 university graduates (men). With these, also, Miss Dudley tested 25 students of an American women's college (Bryn Mawr), and Dr. Berger 40 students of a German gymnasium. In these cases a list of ten words was first used for practice, the results not being recorded. The average time of

[1] The nouns were divided into three classes: *author* and *hour* are not as concrete as *book* and *clock*.

association in seconds is given in Table II., the interval including, however, the perception-and-movement-time.

TABLE II. *Average Time of Association.*

	CONCRETE.	ABSTRACT.	PROPER.	VERBS.	ADJ.
B.....	1·53	1·77	2·06	1·68	1·74
C.....	1·14	1·2	1·28	1·2	1·16
S.....	1·76	2			
E.....	1·88				
H.....	1·19				
University Graduates..	2·11	2·42			
Bryn Mawr College.....	3·14	4·1			
Gymnasium II*b*.....	2·42	4·31			
id. III*b*.....	4·46	7·07			

With these observers, consequently, the average time of the mental process varied from a little more than one to about seven seconds. These varying times evidently indicate important personal differences in rate of thought and stage of mental development. The shorter times may be partly referred to clearer understanding of what was to be done and to greater decision in choosing out some special association, as well as to the fact that some think faster than others. Other conditions, such as practice, are also concerned, and the nature and complexity of the process doubtless varies considerably with different observers. But all the factors are psychological; and, while at present we may not be able to define the part played by each, we may hope that such experiments will ultimately throw light on the development and nature of thought. It will be noticed that in all cases the associations on abstract nouns took up more time than those on concrete nouns, but the ratio of the two times varies with the different observers, and shows that the use of abstract thought greatly quickens its relative rate.

(*c*) Our third series of experiments was made with the three lists of nouns above-mentioned, but the observer, instead of naming a single association for each word, wrote what was suggested during 20 secs. The average time could thus be obtained, but the first association of the series differs somewhat from the following, and the time devoted to writing was a larger part of the whole interval than was the movement-time when the suggested idea was named. Table III. contains a summary of our results, the average time for each word being given in secs. The observers were mostly students of a London and a Dublin girls' school. The experi-

ments in the latter were made by Miss Josephine Conan, who also made those on the Irish Royal University graduates.

TABLE III. *Average Time of Association.*

FORM.	NO. OF PERSONS.	AVERAGE AGE.	ON CONCRETE NOUNS.	ON ABSTRACT NOUNS.	AVERAGE OF BOTH.	RATIO OF CONCRETE TO ABSTRACT.
	LONDON SCHOOL.					
VI.....	30	17·8	3·70	4·55	4·13	·81
V.....	138	16·3	4·26	6·06	5·16	·7
IV.....	111	14·8	4·76	7·41	6·09	·64
III.....	84	12·7	6·90	11·76	9·33	·59
Average.....		15·1	4·76	7·14	5·95	·67
	DUBLIN SCHOOL.					
	71	14·5	6·25	8·34	7·30	·75
	BRYN MAWR COLLEGE.					
	10		3·51	4·88	4·20	·72
	LONDON GRADUATES.					
	13		3·03	3·85	3·44	·79
	IRISH GRADUATES.					
	8		3·08	3·92	3·58	·75

The Table explains itself. A distinct shortening of the mental process accompanies growth and education. The students of the sixth form of the London school required less than half the time of students of the third form. A corresponding result was obtained in the German gymnasium (see above Table II.).[1] The girls in the Irish school required about the same time as girls of the same age in the English school, and the students in the American college the same time as the students in the sixth form of the English school. It will be noted that the relative time for the abstract associations becomes less as the students are older; it is less for the Irish than for the English students. The number of students in the forms of the English school was sufficient to eliminate accidental sources of variation. The times for the separate divisions of the forms are not so regular, but any variation can to a large extent be explained by the character of the class, and in turn throws light on it.

[1] Dr. Berger has recently published experiments on the rapidity of mental processes in the different classes of a German gymnasium. See *Phil. Stud.*, v. 170 ff.

The 363 students of the London school were divided, according to their class-rank, into four parts. The average time of association for each quarter is given in Table IV.

TABLE IV. *Average Time of Association according to Rank.*

	CONCRETE.	ABSTRACT.	AVERAGE.	RATIO OF CONC. TO ABST.
1st Quarter.....	4·65	6·90	5·78	·67
2nd Quarter.....	4·88	7·14	6·01	·68
3rd Quarter.....	4·76	6·90	5·83	·69
4th Quarter.....	5	7·41	6·21	·67

This shows an increased rate of association as the class-rank of the students is higher, but the difference is not great. Indeed, it is possible that such experiments measure the alertness of the student's mind more accurately than does the class-rank, which depends largely on diligence and other factors not telling in such experiments. The Table does not show a difference for the several quarters in the relative rate of the concrete and abstract associations; consequently higher class-rank does not seem to be accompanied with greater ease in abstract thought, attention to objective details being equally useful.

We may lastly notice the average number of associations made by the English students in 20 secs. on the several words used. This is given in the next Table, and, for convenience, the amount that it is above or below the average.

TABLE V. *Average Number of Associations with different Words.*

CONCRETE NOUNS.						ABSTRACT NOUNS.					
House	4·7	+·6	Bird...	4·1		Time....	3·9	+1·1	Love.....	2·4	−·4
Tree...	4·6	+·5	Shoe..	3·9	−·2	Courage	2·9	+·1	Strength	2·6	−·2
Ship...	4·8	+·7	Hat...	3·8	−·3	Form...	2·7	−·1	Part.....	2·4	−·4
Chair.	4	−·1	Child.	3·7	−·4	Virtue...	2·3	−·5	Beauty..	2·8	
Clock.	3·9	−·2	Hand.	3·6	−·5	Art.....	3·1	+·3	Number	2·7	−·1
Average.....4·1						Average.....2·8					

The Table shows a tolerably constant decrease in the number of words written as the series was continued. Thus with the first word of the concrete list on the average 4·7 associations were made, with the last word 3·6; with the first word of the abstract list 3·9, with the last 2·7. This bears witness to, and in a way measures, fatigue or decrease in attention as the experiments were continued. The falling-off in the number of associations was not, however, regular, and we may thus see that some ideas lend themselves more readily to associations than others. It was found easier to make associations on *ship* than on *clock*, on *time* than on *virtue*.

3. The Nature of the Association.

We have explained the method used to obtain our associations. The observer was given a word and was required to say or write as quickly as possible what other word was suggested by it. For the sake of uniform results and for other reasons, this seemed the best way to begin an investigation into Mental Association, but it by no means concludes it; our experiments being, as we have seen, conditioned by the need of *naming* the suggested idea and doing it *quickly*. The nature of the process can best be gathered from our results, wherefore we give them as fully as is consistent with the reader's convenience. The lists of ten concrete and ten abstract words were used with 465 observers, and in Table VI. we give all the associations which occurred ten times or oftener, together with the number of times they occurred.

Table VI. *Most Frequent Associations.*

CONCRETE NOUNS.

House.	74 room(s), 43 window(s), 39 brick(s), 25 [door(s), furniture], 23 garden, 19 people, 12 chair(s).
Tree.	212 leaf (ves), 45 branch(es), 28 green, 17 flower(s), 11 colour, 10 shrub.
Ship.	111 sail(s), 80 mast(s), 67 sea, 33 water, 19 boat, 16 [sailor(s), wood].
Chair.	115 leg(s), 64 wood(en), 52 seat, 46 table, 35 cane, 14 sitting, 12 stool.
Clock.	157 time, 121 hand(s), 27 watch, 22 pendulum, 18 tick, 14 [face, works].
Bird.	131 wing(s), 69 feather(s), 40 song(s), 23 singing, 15 sings, 14 flying, 12 nest.
Shoe.	86 leather, 74 boot(s), 60 foot (eet), 46 lace(s), 24 sole, 18 heel, 17 button(s).
Hat.	70 head, 46 feather(s), 41 straw, 33 ribbon(s), 32 bonnet, 30 trimming(s), 12 cap, 11 brim.
Child.	35 boy, 29 mother, 21 baby, 20 dress, 18 young, 16 girl, 15 parent, small, 13 age, 12 man, 10 [hair, infant, pretty, toy(s)].
Hand.	219 finger(s), 23 nail(s), 20 arm(s), 15 foot (eet), 13 glove(s).

ABSTRACT NOUNS.

Time. 102 clock, 56 hour(s), 27 minute(s), 18 tide, 13 watch, 12 year, 11 work.
Courage. 103 bravery, 68 brave, 19 strength, 16 bold(ness), 10 [fear, hero, man].
Form. 74 shape, 10 colour.
Virtue. 127 good(ness), 45 vice, 14 [patience, truth], 10 grace.
Art. 115 painting, 49 drawing, 45 picture(s), 43 science, 18 music.
Love. 34 kind(ness), 24 affection, 36 hate(red), 16 [mother, parents], 15 friendship, 12 like, 11 gentleness.
Strength. 46 strong, 43 weak(ness), 30 power, 26 force, 21 man, 15 courage, 14 health, 13 muscle.
Part. 60 whole, 24 portion, 18 share, 17 half, 13 piece.
Beauty. 55 lovely(iness), 46 pretty(iness), 22 ugly(iness), 16 face, 10 beautiful.
Number. 44 figure(s), 39 many, 34 one, 18 quantity, 17 arithmetic, 10 crowd.

We shall give below a classified list of all associations made on *house* and *time*. Here it may be worth while to call attention to the frequency of certain associations as shown by the Table. Thus, to nearly half the observers *tree* suggested *leaf* (*ves*) and *hand finger(s)*. In the above Table an average of less than eight associations with each word is given, and more than half of all the associations made were included within these narrow limits.

Before treating of the classification of our results, we shall give, in addition to Table VI., a selection from the associations made by B and C on the longer lists of words. The original word is given first in each couple, and after it the associated word.

TABLE VII. *Examples of Associations.*

B. Water—pail, candle—stick, curls—yellow, tooth—wash, rod—spare, elbow—out at, cloak—blue, jam—raspberry, cap—fur, house—door, hair—golden, watch—clock, heathen—Christian, coat—red, nightingale—bird, philosopher—wise, battle—soldiers.

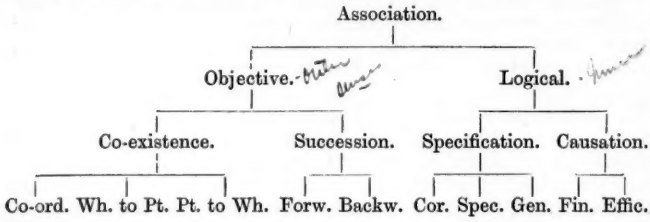
C. Garden—house, forest—tree, spectator—theatre, rod—child, beast—beauty, melody—tune, queen—king, friend—enemy, affect—effect, building—house, mind—magazine, music—art, farm—food, rib—Eve, water—flow, tea—drink, protection—government, heathen—heath.

The associations given in Tables VI. and VII. illustrate the "Laws of Association" dwelt on by the English psychologists. The majority of them could be classified under Contiguity in space and time, Similarity and Contrast. Following the best authority, we may at once depose Contrast to a subdivision. We should then have left Contiguity in space and time, and Similarity. These two classes represent fundamental differences which are borne out by our experiments. Contiguity in space and time defines, perhaps, with sufficient accuracy the nature of the associative link, but the meaning is clearer when we

reflect that this class contains such associations as have been given us ready-made by sensation. Contiguity-in-space does not cover all cases of simultaneous contiguity, for example, a melody suggesting the words belonging to it. Contiguity-in-time calls up too much the idea of disconnected and sharply defined events following each other, whereas the associations of this class are probably due to the overlapping rather than to the succession. We prefer to use the terms Objective or Outer to define association due to previous connexion in sensation, and to subdivide it into Co-existence and Succession.

Similarity seems to be an unfortunate term. It gives at the outset an explanation, which is altogether rejected by many psychologists, and it does not naturally include cases of specification, definition and cause. In contradistinction to those associations which are given in sensations, we wish to designate such as are due to thought. These we shall call Logical or Inner. We do not wish to imply that the link of association must be wholly objective or wholly logical, on the contrary the results of our experiments show that in many, if not all, associations both factors are concerned. But in most cases it is easy to see which is predominant. Logical associations we shall subdivide into Specifying and Causal, analogous to the division of objective associations into co-existing and successive.

These four classes may with advantage be further subdivided. In the case of the Objective-Co-existing associations, there is an important distinction as to whether the movement is from Part to Part, from Whole to Part, or from Part to Whole—for example, whether *house* suggests *garden*, *window* or *street*. There is a quite analogous distinction with the Logical-Specifying associations, the relation in which may be Correlation, Specialisation or Generalisation; thus *house* may suggest *church*, *villa* or *building*. In Successive associations the direction may be forward or backward, that is, in an order the same as, or the reverse of, the original presentations,—thus, *house* may suggest *top* or *glass*. Analogously Causal associations may be either Final (forward) or Efficient (backward), that is, may give end or means, the terms being used in a sense broad enough to include all causal relations; thus *house* may suggest *shelter* or *builder*. The plan of classification which we obtain is thus as follows:—



In Table VIII. we give all the associations made by 465 observers on the words *house* and *time*, classified according to the method we have proposed.

TABLE VIII. *Associations with*

House.

Co-ordination—25 furniture, 23 garden, 19 people, 12 chair(s), 7 table(s), 4 trees, 2 bed, pictures, 1 [boy, cat, girls, grounds, lady, master, men, road, servant-girl]; (103).
Whole to Part—74 room(s), 43 window(s), 25 door(s), 13 roof, 7 stairs, 6 bricks, walls, 4 chimney, 3 storey, 2 floor, stones, 1 [bedroom, glass, kitchen, street-door, slates]; (190).
Part to Whole—3 [street, town], 2 road; (8).
Forwards—7 -top, 4 -maid, 2 [-dog, -rent, -to let], 1 [-agent, -hold, -of commons, -step, that Jack built, watch, -wife, -work]; (25).
Backwards—1 glass; (1).
Correlation—6 cottage, 5 mansion, 2 cot, 1 church, hut, 3 mouse (*verbal*); (18).
Specialisation—6 tall, 5 [brick, size], 3 [home, large, situation], 2 [dolls, height, high], 1 [big, grey, kind, low, magnificent, Morton Hall, pretty, this house of wood, tool-house, villa]; (41).
Generalisation—7 buildings, 5 dwellings, 2 habitation, 1 abode; (15).
End—3 [home, inhabitants], 2 [inmates, to live in, shelter], 1 [dwelling-place, habitation, live, people]; (16).
Means—33 bricks, 6 builders, 2 built, 1 [build, stones, wood]; (44).
Unclassified—1 [dice, hat, wind]; (3).
Misunderstood—(1).

Time.

Co-ordination—(0).
Whole to Part—(0).
Part to Whole—(0).
Forwards—18 tide, 11 work, 7 flies, 2 [be quick, space], 1 [ever-rolling stream, flies fast, how it flies, -keeper, money, o'clock, price, race, reapers, slaves, -table, "time, gentlemen, time," -to do it, -to learn, -up, "waits for no man," -waits]; (57).
Backwards—1 [lose, lost, thief, when Father Time]; (4).
Correlation—8 eternity, 6 place, 5 [age, space], 3 [hurry, speed, to death, quickness, weather], 1 [duration, duty, haste (need for), life, manner, old age, swiftness], 3 thyme; (49).
Specialisation—56 hour(s), 27 minute(s), 12 year, 9 [day, long], 7 [late, lessons], 4 [quick, second(s)], 3 [length of time, scythe, short, when], 2 [early, fast, holidays, how long, how much, lost, night, quickly, seasons, waste], 1 [classes, examination, fast or slow, Father Time, for play, good, image, infinite, leaving school, magazine *Time*, moment, no time now, present, slow, slowness, something o'clock, soon, swift, term, train, twenty-four hours, what, what time, what time now, youth]; (194).
Generalisation—4 length, 3 space, 1 [passing, value]; (9).
End—1 [commerce, employment, not to waste, use, work]; (5).
Means—102 clock, 13 watch, 2 [hands (of clock), works (of clock)], 1 [hour-glass, sun-dial, tick (of clock), vibration]; (123).
Unclassified—1 [poems, temper, water, will]; (4).
Misunderstood—(23).

This classification gives the most convenient divisions which we were able to make of the associations obtained by our experiments. We do not, however, look on the classes as 'natural kinds'. On the one hand our subdivisions run into each other, and an association is rarely or never due to one only of the relations; on the other hand further subdivisions might be made.

The relation of Part to part, Whole to part, and Part to whole, with the corresponding logical subdivisions, Correlation, Specialisation and Generalisation, are perhaps the most important of the distinctions, but they are not defined with entire sharpness. Thus it depends on the attitude of the observer's mind whether *house—furniture* is a relation of Part to part or of Whole to part, and *house—cottage* of Correlation or Specialisation.[1] It seems possible that in most cases of Co-ordination the mind goes first to a whole and then to a part; thus, *house* may call up the complex *house and garden*, but there being no convenient name for this, *garden* is named. In associations which have been put under Cause and Succession the movement is often from a part to a whole; thus, when *bird* suggests *sings*, the total complex may be a singing bird, and when *house* suggests *top*, the part leads to a verbal whole.

As concerns further subdivisions of the classes, it is evident that the Objective associations might be distributed among the senses by means of which they were originally given. As a matter of fact the associations of Co-existence are almost without exception visual, and the associations of Succession verbal, *i.e.*, a complex of auditory, muscular and perhaps visual sensations (of printed words). The Logical associations might conveniently be further subdivided. Similarity and Contrast are natural subdivisions of Correlation, and there is an intervening class represented by associations such as *king—queen*, *shoe—boot*, &c. Then verbal similarities such as rhymes and alliterations are materially different from the rest. Specialisation includes a general or particular case as, *strength—man*, or *Sampson*, and a qualification, as *hair—yellow*. Generalisation includes associations as different as *snow—white* and *music—art*. An End or Final Cause may be purpose, object or act, as in the examples, *house—shelter*, *love—mother*, and *boy—run*, and in the case of act the given idea may be taken either as active or passive; thus water may suggest *flow* or *drink*. Under Means or Efficient Cause are included source, material, &c.

Returning to our chief divisions, we give in Table IX. the percentage of associations falling to each. It contains the results of more than 12,000 observations made with 516 observers. The majority of these, however, were school-girls, as their results

[1] In Table VIII. such associations are put under Co-ordination, but C thinks in the case of young students the relations were most likely of Whole to part and Specialisation. There are also a few other cases in which the writers differ as to the classification.

dominate. An analysis for different classes of observers will be given below.

TABLE IX. *Percentage of Associations.*

		CONCRETE.	ABSTRACT.	PROPER	VERBS.	ADJECT.
	No. of Associations	6120	5310	200	200	200
Objective.	Co-ordination	10	0	17	0	0
	Whole to Part	34	0	10	0	0
	Part to Whole	1	0	17	0	0
	Forwards	4	5	9	15	9
	Backwards	2	1	5	1	0
Logical.	Correlation	10	33	16	18	18
	Specialisation	19	31	7	48	68
	Generalisation	3	8	5	0	1
	Final Cause	13	4	12	9	0
	Efficient Cause	1	4	2	9	4
	Unclassed	1	2	0	0	0
	None	1	6	0	0	0
	Misunderstood	0	6	0	0	0
	Objective	51	6	58	16	9
	Logical	46	80	42	84	91
	Verbal	6	6	11	14	6

The Table shows that in the case of concrete nouns the ratio of Objective to Logical associations was 51 : 46, that is, the link of association was not quite as often supplied by thought as by sensation. As regards subdivisions it will be noticed that Whole to part and Specialisation are favourite categories, whereas Part to whole and Generalisation are not often used.[1] Employing the terms to include both Logical and Objective associations, Co-ordination was the relation in one-fifth of the cases, Whole to part in more than half, and Part to whole in one-twenty-fifth. In Succes-

[1] Steinthal says (*Einl. in die Psych. u. S.W.*, p. 161) the part more readily suggests the whole than the reverse, because "the mind rests in the thought of a whole". The advantage of experiment to theory is illustrated by comparing this with our results.

sion, Backwards occurred half as often as Forwards; and in Cause, Efficient was much rarer than Final. In 1 per cent. of the cases the association could not be classified, and in 1 per cent. no association was made. Our classification is not as useful for abstract as for concrete nouns, as with abstract nouns, Objective associations, other than verbal, scarcely occurred. The classes Correlation and Specialisation are about equal in size, each including nearly one-third of the cases, and four times as many as Generalisation. Fewer experiments were made with proper nouns, verbs and adjectives, and these were confined to B and C. In the last line of the Table is given the percentage of cases in which the association seemed to be purely verbal.

The nature of the association differs considerably with different persons and classes of persons. This variation in the case of concrete nouns may be studied in Table X. The first four columns contain the results of experiments made by Mr. Edgeworth, Miss Collet, and the writers; the fifth column by 31 university students and graduates (mostly women); the four following columns by the several forms of the London girls' school; the next column by the Dublin girls' school; and the last column by the boys of a German Latin school.

TABLE X. *Percentage of Associations with different Observers.*

OBSERVERS.	E.	CT.	B.	C.	UNIV. GRADS.	LONDON SCH. VI.	V.	IV.	III.	DB. SCH.	GER. SCH.	AV.
No. of Assoc....	250	250	250	250	310	300	1380	1110	840	710	470	
Co-ordination..	11	8	14	9	7	15	12	10	10	7	3	10
Whole to Part..	4	3	4	1	47	35	41	47	42	30	32	34
Part to Whole..	1	6	3	3	0	3	1	0	1	0	4	1
Forwards.....	3	14	14	10	1	1	1	1	0	5	10	4
Backwards.....	5	19	5	2	0	0	0	0	0	0	5	2
Correlation.....	22	19	20	12	9	24	6	4	6	13	17	10
Specialisation..	33	19	24	21	20	10	18	19	15	23	16	19
Generalisation.	11	1	5	2	2	1	1	3	2	5	5	3
Final Cause.....	7	3	8	37	11	10	15	11	16	12	7	13
Efficient Cause.	1	2	1	3	2	0	1	2	1	0	1	1
Unclassed.....	0	4	0	0	1	1	1	1	1	1	0	1
None.....	0	0	0	0	0	0	1	0	4	4	0	1
Objective.....	24	50	40	25	55	54	55	58	53	42	54	51
Logical.....	74	44	58	75	44	45	41	39	40	53	46	46
Verbal.....	8	33	26	12	2	1	2	1	1	8	14	6

The Table shows that Logical and Verbal associations are favoured by the first four observers, who teach and write. With the students Whole to Part is the favourite category, they seem to visualise the object and name some part of it. With the English school girls less than half the associations are Logical, and very few are Verbal. With the Irish school girls more than half are Logical, and 8 per cent. are Verbal; this is perhaps due to the fact that the training in the Irish school is more literary. While the students of the London school made only about 1 per cent. of Verbal association, Ct and B, who teach in the school, made respectively 33 and 26 per cent. The 14 per cent. of Verbal associations made by the German students is doubtless due to the nature of the language. The largest proportion of logical associations ($\frac{3}{4}$) was made by E and C, who are engaged in abstract studies.

The nature of the association depends not only on the observer, but also on the word given. The percentage of the several kinds of associations occurring with different words is given in Table XI.

TABLE XI. *Percentage of Associations with different Words.*

456 ass. on each word.	TREE.	CHAIR.	BIRD.	CLOCK.	CHILD.	HAND.	TIME.	ART.	COURAGE.	LOVE.	NUMBER.	BEAUTY.
Co-ordination..	4	10	12	1	12	10	0	0	0	0	0	0
Whole to Part..	65	40	46	41	11	56	0	0	0	0	0	0
Part to Whole..	2	2	1	0	0	1	0	0	0	0	0	0
Forwards.....	0	0	0	0	3	3	12	2	2	5	2	3
Backwards.....	0	0	0	0	0	0	1	1	0	0	0	0
Correlation.....	8	8	1	8	16	5	10	15	54	36	21	30
Specialisation..	15	29	13	4	40	9	42	62	16	12	52	37
Generalisation.	5	0	1	1	7	2	2	6	18	15	6	18
Final Cause.....	1	9	23	42	4	9	1	4	2	18	1	3
Efficient C.....	0	0	0	0	0	0	26	7	0	2	7	2
Unclassed.....	0	0	2	2	2	1	1	1	2	1	2	0
None.....	0	1	1	1	5	4	5	2	6	11	9	5
Objective.....	71	52	59	42	26	70	13	3	2	5	2	3
Logical.....	29	46	38	55	67	25	81	94	90	83	87	90

The Table shows that the association is largely determined by the original word. *Tree* and *hand* are natural objects which are easily pictured, and have parts (leaves and fingers respectively)

readily named. With *child*, on the other hand, Specialisation was the favourite category. Final Cause was the largest class in the case of *clock*, a thing made and used for the special purpose of measuring time. Conversely *time* often suggested the means of its measurement. Of the other abstract nouns, *art* and *number* were commonly specialised, while *courage* and *love* most frequently suggested a similar or contrasted idea.

We wish to lay special stress on our Tables, as these contain the results of extended series of experiments. In a joint paper it is not convenient to enter into criticism and discussion; we have, consequently, confined ourselves to the exposition of our research. We, however, add a section in which several of the observers discuss the experiments with special reference to the subjective aspect of the association.

IV. Remarks on the Experiments.

By G. F. Stout.

I wish chiefly to draw attention to the nature of the process by which the mind passes from the given idea to that suggested idea which is the first to be definitely recognised and named. In my case the transition seems to be most commonly mediated by a more or less obscure total presentation, including as part of its content both the given and the suggested ideas. At the time when I was subjected to these experiments, I always felt that the word which came first to my lips, and which was therefore set down in Dr. Cattell's list, was a hopelessly inadequate indication of what was actually taking place in my mind. By retrospection following close upon the actual process, I was for the most part able to recover and analyse those contents of my consciousness which I had found it impossible to express in words or to render explicit in thought.

Examples will make my meaning clear. *Smoke* suggested *fire*. The intermediate link in this case was not the picture of a fire smoking. It was the phrase, "Where there is smoke there is fire". Nor was the connexion merely a verbal one. The words were quite indistinct. The first among them to emerge into clear consciousness was the word *fire*. In the intermediate state, what vaguely floated before my mind was the general sense of the saying considered as an example of inference. There was also traceable in my mind a dim and distant reference to a lecturer who had used this illustration in my hearing. *Finger* suggested *heart:* in this instance, transition was mediated by the vague total presentation of the circulation of the blood. I thus came to think of the heart as propelling blood to the extremities. *Cannibal* suggested *Andrew Lang*. Here there loomed before me the massive and blurred presentation of what I now in retrospect name and recognise as "anthropology". In this in-

distinct totality, the first detail, besides the given one *cannibal*, which acquired sufficient definiteness and salience to be verbally expressed was the name of the well-known author, *Andrew Lang*.

It would be possible for me to analyse a large number of similar examples. The great majority of the suggestions in my case were of the kind described. The transition from *tail* to *the rest* is worth noting, because in this case the process was concluded, so to speak, at an earlier stage than usual. *Tail* revived the obscure presentation of the whole animal. Instead, however, of singling out some special detail within this whole, it occurred to me just to name *the rest* of it without further ado.

The instances in which I proceeded from given whole to a part of that whole, or from a given part to the whole comprehending it, were comparatively few, and I do not think that they require any special discussion. The usual course of reproduction in my case passed from a named and definite partial presentation by the mediation of an unnamed and obscurely defined total to another named and definite partial presentation.

The next point to which I wish to call attention is the limitation imposed on the subject of the experiments by the necessity of finding a verbal expression for his thought as soon as possible. This is certainly a disturbing condition, which interferes with the analogy between the experiments and the normal course of reproduction. There is perpetually present in the mind of the experimentee a voluntary effort to find some word or other, whatever it may be. This circumstance seems to me greatly to augment the influence of merely verbal connexions on the flow of ideas. It might be well to try experiments in which no regard should be paid to the time occupied by the process of suggestion.

In conclusion, I may remark that what interests me most in these experiments is the indication which they seem to afford, when closely examined, of the operation of obscure links in the process of reproduction. The psychological atomism of the English associationists is perhaps mainly due to the neglect of these obscure phenomena. If we lose sight of the indistinct whole which mediates transitions between its component parts, the train of ideas must of necessity appear a separate and exclusive succession.

By F. Y. Edgeworth.

With regard to these words I have hardly any explanation to give. I just stuck down, or rather cried out, whatever word came up first. The first word did not always correspond to the first idea. Often there seemed to be a throng of ideas struggling for expression. Thus, in the case of *Saint Matilda*, the word *Saint* raised the ideas of an amiably mild lady, in fact the picture of Saint Cecilia, only I could not remember in time her name; and the first name which occurred was that of the heroine in *Rokeby*, suggested by some similarity of character.

I could have gone a little faster, I think, if I had made an effort; but I thought it best to make as little effort as possible. The most conscious exercise of will occurred after assigning adjectives to several words, such as *beautiful* to *hair*, *bright* to *lamp*. I felt it would be stupid, and perhaps disappointing to the experimenters, if all the results came out of this type, so I changed my hand and checked the flow of adjectives.

By E. P. Hughes.

My attitude of mind during the experiment was this: I did not care at all what words were suggested; my mind was free to suggest any words; but I had decided the words were to come quickly. I *willed* that they should come quickly; I did not *will* as to the kind of words that came.

At first I found nouns suggested nouns, and there was generally a connexion that could be traced. After a little, however, I found the nouns suggested not nouns but whole sentences, and a word out of these sentences was taken, sometimes an adverb, or a verb, or an adjective, and very occasionally a noun. *E.g.*, the word *slave* brought up to my mind many sentences expressing my detestation of slavery, and I said the word *bad*.

I allowed my mind to work in any direction as long as it worked quickly; but all the time I found myself criticising the connexions, and generally recognising whether they were reasonable or not, and being amused at absurd and far-fetched connexions, and also when the word said was in no way connected, as far as I could see, with the word given.

I found a great difficulty in remembering afterwards the words I had said. I found it easier to remember them several minutes later than immediately after I had said them. In one instance I utterly failed to remember what word I said at the time, and remembered it with little effort ten minutes later.

I found it was easy to say words after the first three or four words of the 10 words in a group; it then became difficult, but I felt at the end of the 10 words, if the list had been longer, I should eventually have given the words more quickly.

After two or three groups of 10 words, I came to a word I could not read, and from that time I felt a waste of energy in so far as I continually dreaded meeting a word I could not read. In the fourth group I misread a word, and thought it was a verb and not a noun, and when I learnt my mistake I felt there was a further expenditure of energy to the end of the experiment, because I always dreaded taking a noun for a verb; and once the word *bottle* raised in my mind the question whether it was a verb or a noun, and I said mentally 'noun,' and ejaculated *Yes*.

When I started by mentioning the 'colour' of a noun given I generally gave several colours, and the same with 'shape'. I found there was a greater inclination to give shape than colour.

Occasionally I remembered the general impression given by a word, *e.g.*, *slave*, but I could not remember the particular word I gave, *viz.*, *bad*.

The word *cow* appeared frequently. I have a special horror of cows.

Hat-good: I had lately made a hat-rack, and one part of it was specially praised; my teacher was a foreigner and used the word 'good,' and, as he did not speak in English as a rule, the word was very impressive. *Baggage-bandage:* my father, when a surgeon in the militia, kept a supply of bandages in his baggage, which I had rolled up sometimes.

By C. E. COLLET.

Eight per cent. of the words suggested by the 250 concrete nouns selected for experiment were names of things in coexistence; here in nearly every case the idea excited by the name suggested the next idea, and that idea suggested the name: the mental processes were comparatively simple. The word *cavalier* suggested the word *Charles I.*, having aroused a picture of the times of Charles I., in an atmosphere of Sir Walter Scott's novels, with Vandyke's portrait somewhere in space. *Scaffold* suggested confused representations of persons in fiction ascending scaffolds, including Sydney Carton (*A Tale of Two Cities*), Clayton the actor, and, most distinct of all, Strafford, whose name was the one actually uttered. The names of the others did not enter my thoughts, and the whole picture was vague, most prominent being the representation of feelings excited when reading the stories of Carton and Strafford.

Only two per cent. of the words suggested were the names of parts of the things denoted by the words read.

Six per cent. were names of wholes suggested by names of parts; *e.g.*, *violin* suggested by *string; theatre* by *curtain; Attic* by *philosopher*, this association being partly due to an image of *Le Philosophe sous les Toits*, and partly to the verbal association 'Attic philosopher'.

Fourteen per cent. of the words come under the head of Forwards Associations, nineteen per cent. under the head of Backwards Associations; so that thirty-three per cent. are classed as Verbal Associations, and of the nineteen per cent. classed under Specialisation many are undoubtedly verbally suggested.

As examples of verbal forwards associations, *bell* suggested *bell-horse*, the name given by workmen to men encouraged to spur them on to greater speed; *cap* suggested *cap-à-pie*, neither word raising any representation beyond the printed letters; *mob* suggested *mobilise; hand* suggested *hand-maiden*. In these cases the train of thought is started by words, not by ideas. One noteworthy exception to this is the suggestion of the word *sweep* by the word *chimney*. This word at once revived Hans Andersen's story of the China shepherdess; the word was localised in China-

shepherdess land, and the whole story reviewed, so far as I can judge, before the word *sweep* came to the lips as the easiest to be uttered.

The 48 words classed as instances of Specialisation, and the 48 words classed as instances of Backwards verbal association resemble each other in being to a great extent the result of verbal association, but the dominating mental process was different. The specialisations were nearly all suggested by words rather than by a specialising process on my own part, but the words did actually suggest to me the special things, and my attention was given to them; *e.g.*, *garden* suggested *kitchen*, and attention was given to the representation of a kitchen-garden. Under the head of Backwards associations I have put words which were verbally suggested but which were not accompanied by representations of the things denoted by them. The instances under this class are the results of a complex process. *E.g.*, *ornament*. The first syllable, together with the meaning of the word, aroused faintly the words, "Beauty una*dorn*ed ad*orn*ed the most," and the first word actually uttered was *beauty*.

Men suggested the title of Stevenson's book, *The Merry Men*, but concomitantly with it rose the representation of the story in which I localised the 'men'—the story, not the book. The written word seems always to take up a position in space and to be a kind of keyhole through which the mind passes to an imaginary world. It arises most probably from a constant habit of reading fiction and looking at a world located beyond the printed page which gives admittance to it.

The word *skin* was followed by the name *Nicodemus*. At first, although quite conscious of the mental process preceding the utterance of the word *Nicodemus*, I could not see any connexion that *skin* had with it. As soon as I saw the word, I was looking at the representation of a fairy tale: a little dwarf was jumping before the fire, and I seemed to know all about him and to know his name, but I could not say it; *Ne*buchadnezzar (the last part of the name being very faint) rose as somewhat analogous, but not the word I wanted, and was followed by the utterance of *Nic*odemus, which seemed more satisfactory. The word which I wanted to pronounce was Rumpelstiltskin, and the analogy between the names was then and is now quite clear to me; Nicodemus and Rumpelstiltskin seem alike, both rhythmically and in a certain element of ridiculousness which I cannot define. But it was some time before it flashed upon me that *skin* had raised the name and the story of Rumpelstilt*skin* by a backwards association.

Instances of Co-ordination were nineteen per cent. of the whole. In this class many of the words suggested were merely different names for the things denoted by the written words; *e.g.*, *brain* suggested *cerveau*. Compared with the others, this class is noticeable for the absence of reference to books, songs, speeches, &c.

There was not one instance of Generalisation.

By S. Bryant.

The mental process concomitant with the utterance of the suggested word appears to me of such considerable complexity in many cases as to be by no means expressed or even hinted at in the spoken word. This, in fact, expresses one feature of the whole, because that feature was either most interesting, most prominent, most easy to name or earliest in time. In the case of concrete nouns, such as water, plate, lane, the most conspicuous factor of the whole process in my mind was the definite and varied activity of the pictorial imagination. Into whatever class the expressed association eventually falls, there went with it a picturing out of either the expressed or associated idea, or both, with quite a considerable surrounding of local and other particulars.

The simplest cases were those coming under the first head. Thus *water-pail* means a simple picture to the second element in which the spoken word attaches, and this is classed under Co-ordinate Existence; the picture here appeared to be present before the word and to have caused it. On the other hand, *candle-stick* seemed in the making of it to be verbal only—an auditory and motor sequence in time—but the picture of a candlestick followed so simultaneously that this association also might easily have been taken to mean primarily a case of Co-ordinate Existence. Verbal associations with this pictorial sequence occurred quite commonly, and these as well as others I felt bound to classify as Verbal associations, though if made by other people I should have treated them differently in default of the necessary introspective knowledge. With such a verbal association as *rod-spare*, into which was quite consciously condensed the whole quotation, "Spare the rod and spoil the child," imagination threw up vague pictures of naughty children and irate old dames, while the name at least of Solomon rose also to mind, though passing on in haste to the next word on the list. My verbal associations, including rhymes, amount to the large proportion of 26 per cent., being much the largest that occurs with the exception of Miss Collet's high proportion of 33 per cent.

The favourite class for the majority of those experimented on is that of Whole to Part, and this might seem at first to be the most natural expression of the fact that the meaning of a concrete noun is most commonly realised by the formation of a pictorial image. I make, however, only 4·4 per cent. of associations under this head, and only 22 in all the Co-existence classes taken together, while the class of Specialisation alone contains 24·4, and is my most favoured class. But I found the pictorial element very potent in associations of this kind. In *curls-yellow*, for instance, the picture of yellow, curling hair rose distinctly to mind, with attention fixed on its admired character of golden

yellowness; and the associated word is simply descriptive of the image seen under a distinct play of æsthetically inspired imagination. Similar remarks apply to *cloak-blue, jam-raspberry, cap-fur;* the image is described as it happens for some reason or other to be particularised, and in the two former cases I was aware of a preferential motive. In such cases it is probable that the image is less generic than when *house* suggests *door*, or *table chair*. In *house-door* the image may be generic, and the attitude of mind is certainly analytic; while in *cloak-blue* the image must be specific up to a certain extent, and the attitude of mind qualitatively descriptive as well as particularising. Thus the two descriptions *hair-face* and *hair-golden* indicate quite different movements of mind, though they might have started from similar images of hair in the first instance.

In calling such results as we have obtained associations it is understood that the word is used in a broad sense, and any discussion of the limits which should be put on its exact use would not be suitable here. I may, however, point out that the forced rapidity of the process by which the subject of experiment linked each word to each must have tended to secure that the most readily suggested word came to hand first, thus excluding, so far as possible, deliberate acts of choice, which would certainly have presented results that were not mere associations. To secure the minimum of thought proper is essential in the production of associations. Nevertheless, it is quite certain that even with all haste a considerable amount of thinking and choosing does get itself done in these experiments; and I believe the introspection of other observers will bear witness with mine on this point. The exact analysis of the processes and their proper classification would require much careful observation and experiment of an introspective character. All that it seemed possible to do in objective experiments, such as ours were in the main, was to eliminate the higher thought activities as much as we could by not giving them time to produce spoken results.

By J. McK. Cattell.

I find it extremely difficult to observe by introspection the process of association, whether in the usual course of mental life or in experiments such as are here recorded. If, however, I combine the results of these experiments with introspection, I conclude that, when one idea suggests another, they have previously been associated in a common presentation, and that the suggestion is possible because the idea in distinct consciousness belongs to a larger whole, some of it indistinctly given, the rest below the threshold of consciousness. In conclusion, I should like to emphasise the fact that we have made *quantitative* determinations in two directions: we have measured the time of mental association, and obtained statistics of its nature.

V.—DISCUSSION.

ON SOME FACTS OF BINOCULAR VISION.

By JOHN VENN, F.R.S.

There are several points in Mr. Hyslop's treatment of Binocular Vision, in MIND No. 52, as to which I find myself unable to agree with him. As these involve divergences from some of his experimental results, as well as from his inferences, it will be better to give a somewhat independent account of what I personally seem to perceive in these cases, in respect of binocular vision, rather than to attempt a criticism of his general conclusions, which would, in fact, involve rather more space than can well be spared in the 'Discussion'-section of MIND.

It may be briefly stated at once that I take it for granted, for the purpose of the present inquiry, as an ultimate fact, that points whose images fall on 'corresponding' spots of the retina are perceived as single, and that those which do not so fall are perceived as double. And as regards the position in space of the totality of objects whose images will so fall, at any given moment, on corresponding spots, I take for known the usual conclusions as to the form of the 'horopter'. The significance of this last assumption is, however, lessened by the fact that, for such small areas as those of the circles in the following diagrams, the plane of the paper may be reasonably supposed to coincide with the horopter; that is, if any one point in one of these circles is seen as single, so will all other points in the same circle.

The way in which I should approach the discussion is as follows:—The question of binocular vision is very commonly stated in the form, Why do we, with two eyes, see objects single? Surely this is a very misleading way of putting it. The general statement is that we do *not* see objects single, the exception being when we do so see them; though the practical convenience of the 'exceptional' attitude places it in the position of the 'rule,' for ordinary human experience. By calling the above statement the general one, nothing more is meant than what would be meant by such an expression in mathematics, *viz.*, that the exceptions are to the non-exceptions as the finite to the infinite, or as zero to the finite. Suppose that there is a bright point in front of me, then, so far as geometrical or binocular considerations are concerned (that is, omitting the effects of irradiation, non-perception of distinctions or distances below a certain minute value, and so forth), there is one inclination, and one only, of the optic axes by which that point will be seen single, whereas the inclinations by which it will be seen double comprise all the other

possible angles. And when that particular object has been thus reduced to singularity or unity, a corresponding division and ratio prevail in regard to all other objects. No other objects but those on the horopter will be seen single; and the horopter being a surface and space a solid, the proportion of the objects which are not seen single to those which are seen single, at any given moment, may fairly be said to be indefinitely great.

The question, therefore, must be somewhat differently phrased. Under the conditions stated in the second paragraph—that is, taking it as an ultimate fact that our eyes possess the properties there indicated—we may better put the question thus: What is the reason which induces us to select that particular inclination of the optic axes, out of all the possible inclinations, which will reduce visible objects to unity? There is no compulsion in the matter beyond the pressure of habit and of instincts of immemorial origin. In fact it does not appear to me that any other reason is needed than that of practical convenience. When anyone has acquired, by frequent exercise, the knack of 'doubling' any visual object, and, what is more, of keeping it doubled whilst he proceeds to scrutinise either of the two resultant images, most of the performances of visual life can be very fairly carried on under such conditions. I can see what o'clock it is, watch the weathercock, find my way about the streets, even read single words and short sentences, with almost equal ease in either way. The directions in which one fails are mostly the two following. Consider, for instance, the doubled images of the objects on the table before me. The two pictures are, so to say, dislocated and pulled sideways so as to overlap, and consequently each individual object is apt to lie across some other neighbouring object. But when the objects are of various sizes, shapes and colours, and especially when there is a tolerably large unbroken surface upon which they stood out clearly, we find that there is not much difficulty in picking out each of them and considering it separately. The process is certainly no harder than that of reading a letter which has been 'crossed,' where the same sort of discriminative selection has to be made. But when I double the image of a page of the book before me, the result is utterly confusing, for each word falls upon another word which is composed of letters partly or entirely of the same shape, and all of exactly the same colour. Given, however, distinct small objects on a clear surface, no practical inconvenience need be experienced. Nay, there is in certain cases a kind of convenience in seeing objects double instead of single. For instance, if I draw a small figure of any shape on a sheet of paper and double it visually, I can proceed to *trace* that object on the paper, an inch or two to the right or left, exactly as a child does with his transparent slate, by simply making the pencil follow the outline of the transposed image. It requires some practice to succeed at all, owing to the almost invincible instinctive tendency of the two

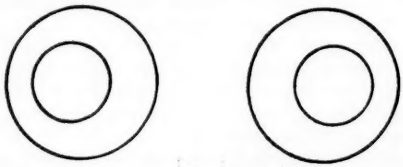
images to coalesce, but with a little time and trouble I found I could make very fair copies in this way; and I apprehend that with long practice very accurate copies might thus be made. Of course, when the two—the original and the copy—are made to coalesce afterwards, the eye is extremely sensitive in observing any discrepancies between the two.

The other difficulty concerns the correlation of our muscular actions with our visual images. I remember, by the way, once speaking with a man who presumably squinted badly, and who gave as a reason for ill-success at lawn tennis that 'he always saw two balls'. I told him that this ought on the contrary to be rather a help to him, as giving him an extra chance, for if he could succeed in hitting either of those balls over the net it would count equally to the good for him. This, of course, was an overstatement, for familiarity with his own way of visualising the world ought by then to have put his eye and his hand into perfect correlation. On actually trying a similar experiment, I found, it must be admitted, that at first I always missed the object, but this was simply owing to my retaining my former muscular associations under new visual conditions. For example, squint strongly at some small object on the table before you, and proceed to hit with a stick at one of the images, and you will of course hit to right or left of the object. (It will not do, by the way, to thrust the stick straight out before you towards the object, as the eye will then follow the stick and prevent the object from being seen consistently double: it is better, therefore, to hit downwards from over the shoulder, so that aim is taken and the stick is in full motion before it comes into sight.) But as soon as I got into the way of aiming midway between the two objects I found that it was perfectly easy thus to hit the two imaginary birds with a single stone.

It was remarked above that the main source of confusion arose from the two distinct superimposed pictures being made up of parts which closely resembled each other, as when we double the printed page of a book before us. In the extreme case of perfect repetition of similar or identical parts, this source of confusion disappears, and any inclination of the optic axes which will serve to bring corresponding portions into superposition will satisfy the eye. Thus any pattern which repeats the same small figure perpetually on a wall-paper, screen or carpet will offer a case in point. So long as we take account of binocular vision only—*i.e.*, consider only the information given by the inclination of the optic axes—there seems no reason for perceiving such an object to be at one distance rather than another. Any inclination of those axes, whether greater or less than the normal one, which will superimpose similar portions of the pattern, will give equal satisfaction. The possible number of such positions is a mere geometrical question, depending upon the closeness of the texture of the pattern as compared with the distance of the object from

us. Practically, of course, we decide by other considerations, such as the focal adoptation of each eye singly, our previous knowledge of the object itself, and still more by the indirect vision we can generally secure of the other objects surrounding the surface on which the pattern lies. But put such a case as this. Suppose the stars were so arranged as to constitute a very close and perfectly uniform pattern over the whole heavens, then mere binocular vision would not justify us in putting them at one of the possible distances rather than another. Or, to take a more natural instance, if on looking out to sea on a dark night there was nothing visible but two lights far out in the distance, separated by a short horizontal distance, there seems no reason, so long as we look at them with both eyes, why we should decide that there were two lights rather than three. Cases of such a kind are of course very exceptional, and the general statement remains true that, with our eyes as they now are, there is just one inclination of the axes for every small object, which prodigiously simplifies the visual picture of that and of the nearly surrounding objects, and this inclination is accordingly selected instinctively and almost inevitably. And the inclination which thus produces simplification serves also the important purpose of deciding the *distance* of the object.

Let us now turn to the consideration of Mr. Hyslop's figures, the first of which is the following:—



As he says, these can be combined in various ways, either by what he calls "convergence" or "divergence," or by various constructions of the stereoscope. For simplicity we will only take one of these, *viz.*, simple convergence, or the effect produced by superimposing the images by increased inclination of the optic axes. That is, double each object in this way, and continue the separation of the images until the middle two of the four (*i.e.*, the left eye's image of the right object and the right eye's image of the left object) shall coincide, and reduce the four to three. Of these three the mind is then to take account as far as possible of the centre one only, *viz.*, that which is seen by both eyes, the outer ones being seen by single vision only.

It will be convenient to decide first what is the exact position and apparent size of the object so perceived. This can be settled readily in either of two ways. In the first place, we can determine the position by a process of simple proportion, the three

deciding elements being the distance between the centres of either pair of equal circles, the distance between the centres of the observer's eyes, and the distance at which the paper is held from the eye. Or, secondly, we may fix the diagram at a convenient distance, and then move a fine needle up and down between it and our eyes until the double image of the needle is reduced to unity by the needle standing at the exact distance at which the object is perceived. I have tried both methods—(there was a reason, as will be presently seen, for taking this trouble)—and find that they agree in giving as accurate and consistent a result as the somewhat rude means at my present disposal could lead one to expect. That is, when the diagram is held at the (to me) convenient distance of 13 inches from the front of the eyeballs, what I seem to see is a couple of circular rings which may be conceived to form the outline of a frustum of a cone, one being nearer the paper that the other. These rings are respectively a little less than half-an-inch and a quarter of an inch in diameter: they stand just about half-an-inch apart; and the furthest of them, *i.e.*, the base of the cone, is about five and a-half inches nearer to my eyes than is the paper. By speaking of this as what I see, it is meant that a solid object of that size and at that distance would produce precisely the same images on our eyes as is produced by combining the two circles of the diagram in the way contemplated. And this appears to me to be all the explanation necessary under the restrictions laid down at the outset.

But here begins one of my points of disagreement with Mr. Hyslop. He speaks of the images being *fused*, or, as I understand, he considers that the eyes simultaneously perceive both the nearer and the farther of the imaged circles as single.[1] If this were so, we should have to admit that points *not* 'correspondent' on the retina could nevertheless yield a single image. That first appearances are in favour of such a view I quite admit. On first looking at the diagram with the requisite amount of convergence, one does certainly seem to see simply two circles, one behind the other. That is, they appear to be simultaneously single, neither of them resolving itself into two nearly coincident but actually intersecting circles. But on very deliberate and careful inspection I see that this is not the case. When I converge my eyes for the small or near circle I can detect that the larger or remoter one is really double, and conversely. The semblance of singleness or fusion arises, I apprehend, simply

[1] I gather this from the whole discussion, but more especially from his speaking (p. 501) of the whole figure of the frustum of a cone as a "fused" image, and from his saying (p. 514) that in constructing the second figure we are to "draw the smaller circles so that they are beyond the limits of combination simultaneously with that of the larger," implying presumably that in the former case they were not beyond those limits.

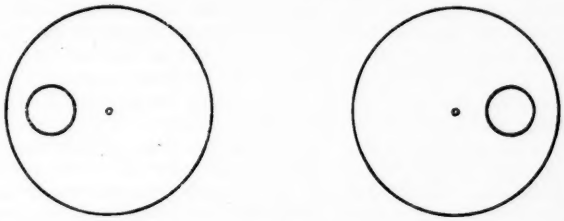
from the fact that the non-coalescing parts of the circles (of the larger or smaller circle as the case may be) are so near together that when seen, as they must be in the case in question, *by indirect vision* they do not appear distinct. It is well known how slight is our customary notice, and how feeble our power of discrimination, in respect of objects whose retinal images lie even but a little away from the yellow spot, and how readily therefore objects which are really double may be taken for granted to be single. But careful observation can do something to remedy this. I feel little doubt that anyone who has given some attention and practice to indirect vision will agree with me that attentive scrutiny will show that to converge the eyes for either circle instantly doubles the other. If anyone cannot see this by mere observation there is a ready help to which he may resort. Fix the paper in a frame at a suitable distance, and arrange a needle to slide up and down, towards or from the paper, but parallel to it, and seen always in the centre of the diagram. Fix this needle at the position in which it is seen single when we are looking (say) at the outer circle or base of the cone. It will then, of course, occupy the place of a common diameter to the two apparently concentric circles. Then run the eye along the needle, from its point of intersection with the outer circle, towards the inner circle. Before we have reached the latter, there will be no mistake about the actual doubleness of this inner circle. The only use of the needle here is, of course, to help the eyes to retain unchanged precisely the amount of convergence they had adopted for the outer circle; untrained and unaided eyes will involuntarily make the accustomed change of convergence in passing from one circle to the other. Fusion, therefore, in the sense in which I understand it to be meant, that is, as including the whole figure simultaneously, is not necessary, and in fact appears to be impossible in such cases.

I observe one characteristic here which the experience of others may perhaps confirm. As regards the fact of *relief* or solidity the illusion is complete: there is no mistaking that one circle looks nearer than the other. But as regards the *distance* of the figure it is otherwise. That it looks nearer than the paper is true, but I cannot feel that it really *looks* as if it were only about seven inches from my eyes. The only way in which I can thoroughly bring this home to me is by holding some slender object, such as a penholder or needle, at that distance before the eye.

Is not the reason of this to be found in the fact that we do not judge of distance by the amount of convergence only, but that, amongst other resources, the focal distance of each eye is also appealed to? The outline of each circle, observe, remains quite sharp even when they are supposed to be consolidated into an object only about seven inches distant. Now, though it is easy enough for anyone to *converge* for that distance, it is quite impos-

sible for anyone with normal sight to *focalise* for that distance.[1] I cannot but suspect that the mind unconsciously recognises this, and therefore detects the consequent incongruity and unreality of the result. Perhaps some short-sighted person will tell us whether the imaginary solid looks more plausible to him than it does to others, as regards its distance from us. The illusion as to distance certainly seems to me much more complete when the paper is held a yard off, so as to place the imaginary solid at a distance of about 18 inches.

Now, consider another of Mr. Hyslop's figures:



and apply the same process of convergence to these circles as we did for the others. Speaking for myself, there are two decided points of contrast between this figure and the last. In the first place it is impossible to reach even the semblance of simultaneous combination or fusion of the larger and smaller circles; and in the second place there is not any such close approach to deception as regards even mere solidity or relief (apart from the apparent distance of the whole figure) that there was in the former case. I feel that in combining the smaller circles I am exerting more 'convergence' than in combining the larger, and I know very well that the same change of convergence would have to be made in glancing from a farther to a nearer object; but I cannot honestly say that the one ring does look nearer than the other. The thing somehow does not look quite life-like here, and I can only thoroughly convince myself of the relief by the needle or pencil test.

Why is this? On first studying the figures I was under the impression that the apparent unreality might arise from the fact that the 'parallax' was too violent; *i.e.*, that two rings, or a frustum of a cone, could not be seen so differently by the two

[1] I presume that the experience of others will confirm me in saying that our power of voluntary control of the focal adaptation is very small in comparison with that of the axial inclination. When gazing at a near object we can easily throw the eye out of focus by adapting it for a supposed remote object, and so blur the outline, but we have no power of performing the converse. At least I used to find that this was so in my own case, until the adoption of glasses altered the circumstances.

eyes unless standing at a distance much too small for convenient vision. But, on 'taking out the quantities' as before, this proved not to be the case. The solid figure here simply consists of two circles about an inch apart, their respective diameters being slightly under five-eighths and one-eighth of an inch, and the distance of the nearer one being about five and a half inches from my eyes when the paper stands at thirteen inches. This is certainly very near—far too near for focalisation by the single eye—but not too near for accurate and convenient management by binocular treatment.

Why, then, does not the result of artificial convergence look natural, or produce any deceptive semblance of relief? Not because we cannot here produce simultaneous fusion over the whole figure, for, as was remarked above, this is not possible even in such a case as that of the former diagram. Several reasons, indeed, occur to one, such as—the incongruity of the focalisation; the fact that it is impossible to draw or print two circles which are as exactly alike as are the two retinal pictures of the same circle; the fact that the paper as well as the circles is visible, &c. Unfortunately these reasons apply also in the former case where there *was* deception. The only explanation that I can suggest is that we are here dealing, so to say, with a differential phenomenon; that the actual relief is double as great in the latter case as in the former, and the proportional relief greater still, since the object is supposed to be nearer; and that accordingly the sum-total of counteracting associations, which were not able to set aside the direct binocular testimony as to a slight relief, may yet be able to shake our full confidence in the existence of a strong relief. But a longer and more varied course of experiments than I am able to attempt at present would be needed in order to decide this point.

There is only space to notice one other point in which my own experience is quite at variance with Mr. Hyslop's. He seems to hold that *single* vision gives us a conviction of magnitude and distance.

For instance, when we converge the images of these circles (and thus form an image of a small circle some six inches off) he says, "I always notice that the central circle seems both nearer and smaller than the exterior circles" (p. 511). Unless we appeal to the feeling of focal adaptation or to extraneous sources

of information—and to none of these is there any reference in the context—I must confess that I notice nothing of the kind. In the first place, the outside circles are naturally seen by indirect vision, when all evidence of magnitude and distance becomes scanty; and when I do glance aside and look at them (with one eye only, but keeping the convergence unchanged, so that the central circle remains fused or single), there is to me no suggestion of one distance rather than another. As regards the direct evidence yielded by single-eye vision, all distances beyond some ten or twelve inches seem to produce exactly the same effect. Any feeling of belief which I may entertain, as to the apparent distance, rests upon extraneous considerations.[1]

As regards the power we possess of determining the distance of an object by the amount of convergence of the optic axes, I apprehend that we have very little power indeed in this way except by *changing* the inclination. That is, when a single object is stripped of all its surroundings, and we gaze steadily at it, we find much difficulty in deciding how far off it is. There is a simple test of this. Take a common magnifying glass, of three or four inches diameter, and look at the reflected images of a lamp which stands some distance behind. One image is from the concave inner surface, and is therefore nearer to us than the glass; the other is from the convex outer surface, and is therefore farther than the glass. But, judging from my own experience, it is difficult to feel sure even of this, and quite impossible to say how far off either image is, without resorting to such help as that of the needle in the former experiments. The reason, presumably, is that the image stands by itself, quite out of relation, so to say, with any familiar surroundings or background, that it is magnified or diminished in apparent size, and its shape distorted. We are therefore left in almost exclusive reliance on the actual amount of binocular convergence, and this seems to be an imperfect support, though doubtless the best

[1] One of the few cases in which I seem to appreciate the distance of an object seen with one eye only places it *too near*. Take the following experience. Look at a bright object such as a candle or lamp, and 'double' it by convergence. But instead of continuing to look, as usual, between the two images, *viz.*, in the direction of the real object, look steadily at the right image. That is, make the right-eye image always fall upon the yellow spot. Increase the convergence, and thus make the two images separate more widely apart, until the left one of these falls upon the blind spot. The result is then as follows. We have strong convergence, only one image visible, and that image so bright that nothing can be seen through it so as to rob it of its apparent solidity. That is, we have all the conditions commonly indicative of a single near object seen by binocular vision, and this may be confirmed by the customary device of holding a pencil on the finger at the spot where this is seen single. And accordingly—at least I find it so—this single-eye object looks unmistakably close. But then this is to resort to binocular considerations.

single support we have. The only way in which I can ever feel the least confidence as to the (either real or perceived) relative position of objects at different distances is by glancing backwards and forwards from one to the other, when the change of direction of the optic axes is easily perceived.

These brief remarks, it need not be said, are not intended as a criticism of Mr. Hyslop's general view. They are merely intended to illustrate my own view, which is (I presume), in essentials, the common view, and to explain the bearing of some of his figures as so interpreted. This view might be summed up as follows:—Our two eyes give us two exactly similar pictures. If the axial inclination were selected at random, these two pictures would intersect, with the confusing result which we see when one semi-transparent sheet of written paper is laid over another. Independently, therefore, of all instinctive tendencies, we should soon find it necessary to select that inclination which we find will happily secure complete fusion of one selected small object, and of a certain area around it. And having done this we secure in addition a clue to the *distance* of that object. On binocular considerations, this inclination of the optic axes is the only clue we have to distance, but it cannot be relied upon except where we are able to glance repeatedly from one object to another. That is, it is not so much a mere muscular position as a feeling of change of muscular position which yields us this knowledge. Any artificial adaptation—such as that of voluntary convergence or divergence, or the stereoscope—which will enable us to superpose similar figures will produce precisely the same effect as if a real solid object were before us. When there is any failure to persuade or deceive us as to the relief, this is owing to our appeal to other than binocular considerations—very possibly, in the case of near objects, to the focal adaptation of the single eye.

VI.—CRITICAL NOTICES.

Mental Evolution in Man. Origin of Human Faculty. By GEORGE JOHN ROMANES, M.A., LL.D., F.R.S. London: Kegan Paul, Trench & Co., 1889. Pp. ix., 452.

In a previous work (see MIND ix. 155, 291, 473) Mr. Romanes endeavoured to distinguish and to define the various grades of mental development exhibited by animals. He now passes from animal to human intelligence, and will attempt to trace a continuous evolution of the latter from the former, so as "to explain the whole mental constitution of man even in those parts of it which to former generations have appeared inexplicable". This problem is, as Mr. Romanes says, "perhaps the most interesting that has ever been submitted to the contemplation of the race". It is a most difficult as well as a most interesting problem, and its difficulty, so far as he has yet dealt with it, has in my opinion proved too great to be surmounted even by the courage and ability of Mr. Romanes. The present volume is limited to a consideration of the origin of Human Faculty, which is identified with the origin of Concepts. Mr. Romanes purposes to treat in subsequent volumes of the further development of human intellect and of the genesis of distinctively human modes of emotion and volition.

The outline of the present argument relating to the origin of concepts is as follows:—

"The faculty of ideal abstraction furnishes the *sine quâ non* . . . to all grades in the development of thought". There is a kind of "rudimentary abstraction" common to man and animals, which may be accompanied by a rudimentary language but is not dependent on language for its existence. It depends on generic images or "recepts". These are "mixed ideas" generated by the fusion of the residua of partially similar percepts with each other and with fresh percepts, as they arise. "As in 'a composite photograph' the sensitive plate is able to unite many more or less similar images into a simple picture, so the sensitive tablet of the mind is able to make of many simple or particular ideas . . . a generic idea." This process being unperceived by the mind in which it takes place is of necessity non-voluntary. In order intentionally to compare and combine ideas, it is necessary to be aware of them as ideas, *i.e.*, to be self-conscious. Generic images, as being unconsciously and passively received rather than voluntarily produced, are called by Mr. Romanes "recepts" in contradistinction from concepts, which originate in the intentional comparison of ideas recognised by introspection as mental states. Receptual cognition is more or less perfect according to the number of recepts formed and according to their generality, *i.e.*,

according to the degree of diversity existing among the component representations united in the generic image. In both respects, the receptual development of the human infant in its earliest stages is not higher than that of the more intelligent animals. Even when it becomes capable of expressing its ideas by gestures and articulate sounds, it does not on that account rise above the intellectual level of those animals which possess a rudimentary language. The signs used by it are at the outset only signs of recepts, analogous to animal gestures and the words used by talking birds. But, unlike animals, the human infant does not remain at this level. His receptual cognition becomes in time more varied and more highly generalised than that of any animal. This "higher receptual" stage forms the connecting link between the mind of man and that of animals. In it the conditions are given on which the genesis of self-consciousness depends. The advent of self-consciousness makes possible intentional comparison and combination of ideas, and it therefore raises the mind from the plane of receptual to that of truly conceptual cognition. Hence the "higher receptual" phase of mental development is also called the "pre-conceptual". Conception is to be identified with the simple judgment, which is expressed by intentionally applying a connotative name. Such judgments are "the essential elements of those more complex judgments which are expressed in formal propositions". They are possible only through an "introspective act in the light of self-consciousness". This light is wholly denied to animals and it does not dawn upon the human infant until his third year; for not until then does he begin to speak of himself consistently in the first person. And, as in the infancy of the individual, so in the infancy of the race, the conceptual is preceded and introduced by a pre-conceptual stage. *Homo alalus* is the forerunner of *homo sapiens*. "Long after the first rude beginnings of articulate speech . . . the half-human creature . . . would probably have struck us as a wonderful adept at making significant signs and movements both as to number and variety, but in all probability we should scarcely have been able to notice the already-developing germ of articulalation." For thousands of years articulate sign-making was not so far developed as even to begin to supersede "pantomime". Another inconceivable lapse of time must have been required to transform *homo alalus* into *homo sapiens*—a being possessed of self-consciousness and of conceptual cognition.

I have given, I trust, a faithful sketch of Mr. Romanes's view. Before proceeding to criticise it, I should like to say that I am not among those to whom Mr. Romanes habitually refers as his "opponents". I hold as strongly as he that psychological evolution is continuous, and that the human has developed from the animal mind. But I regard his mode of representing that development as open to serious objections.

Let us first consider Mr. Romanes's definition of that "faculty of

abstraction," which "furnishes the *sine quâ non* . . . to all grades in the development of thought". "The process of abstraction consists in . . . ideally extracting those features of or qualities" (of a perceived complex) "upon which the attention is for the time being directed. . . . The individual man John Smith could not be disintegrated into so much heat, flesh, bone, blood, colour, &c., without ceasing to be a man at all; but this does not hinder that I may ideally abstract his heat (by thinking of him as a corpse), his flesh, bones and blood (by thinking of him as a dissected 'subject'), and so forth." From this it would appear that, in order to direct attention on John Smith's heat, we must think of him as cold. In order to obtain an abstract idea of a quality, we ought on this view, to lose sight of it altogether. This is of course only a casual slip on the part of Mr. Romanes. It is, however, unfortunate that it occurs at a point where precision was specially required.

Mr. Romanes does not give any lucid explanation of the mode in which the generic image makes possible "rudimentary abstraction". The alleged analogy of the 'composite photograph' is in this connexion misleading. It seems also to have helped to mislead Mr. Romanes in another respect. He speaks too unguardedly of the process by which "recepts" are generated as being purely "automatic". He forgets that, in the interaction of ideas, it is the mind which is active and that the metaphor of the sensitive plate is a metaphor only. Moreover the generic image does not, as he suggests, depend merely on the similarity and partial repetition of percepts. It is also controlled by the degree and kind of interest which these percepts have for the subject.

Language, according to Mr. Romanes, is an indispensable factor in conceptual, but not in receptual, generalisation. At the same time he holds that there is such a thing as a language of recepts, and that this language in its higher development prepares the way for the language of concepts. He regards it therefore as of great importance to his general argument to show that "animals present in an unmistakable manner a germ of the sign-making faculty". His treatment of this subject is perplexing. Absence of self-consciousness, according to the view maintained throughout this book, makes it impossible for animals intentionally to combine ideas, because in order to do so they must be aware of their ideas as such. How then can they, without being aware of their ideas as such, *intentionally* communicate these ideas to others. If the argument has any edge at all, it certainly cuts both ways. Nevertheless Mr. Romanes fills many pages in endeavouring to show that animals use "intentional signs". This oversight seems closely connected with another of equal importance. Mr. Romanes never really defines what he means by a "sign". He is liberal with his divisions and subdivisions of signs, but he never tells us what he is dividing. He never explains how in the mind of the

sign-maker the sign is related to the thing signified, so as to supply a criterion by which to distinguish this relation from other relations, *e.g.*, that of means to end. Now it is precisely such a criterion which is needed in order to estimate the value and import of the evidence adduced in this book to prove that animals use language. When Ali Baba opened the mouth of the robbers' cave by uttering the sounds 'Open, Sesame,' these sounds were not language for him at that moment, any more than the blows of his pickaxe would have been language had he hewn his way into it. How then are we to convince ourselves that a dog is using language when he scratches at the door in order to be let out? Is the dog's action more to it than a means to a practical end? If it is more, how much more is it? A bird warns its fellows of danger by emitting a cry. How are we to determine whether the warning cry is a sign of danger in any other sense than a noise made by the approaching enemy might be so? Most of the evidence adduced by Mr. Romanes lies open to this charge of ambiguity. I am very far from denying that animals use language: but I am not sure that Mr. Romanes has offered adequate proof of it.

Let us, however, concede this point. Suppose that animals do possess a rudimentary language. It still remains to be shown that this language is the germ from which human speech has developed. Mr. Romanes does not, I think, place this problem in the right light. He seems to think that the whole difficulty begins with the transition from receptual to conceptual signs. But on his own showing there is also a wide interval between the lower and the higher receptual language. The latter is characterised by the free combination of signs expressing novel combinations of ideas and by the use of truly depictive gestures representing past events and absent objects. No cases are given in which an animal has either used such depictive gestures or has made novel combinations of signs in an intelligent and intelligible manner. How then is the chasm to be bridged which separates the language of animals from even the preconceptual language of human beings? It is not enough to point out that in human beings the higher receptual is preceded by a lower receptual language, unless it be also shown that the higher is an outcome of the lower. It is not legitimate to say *post hoc, ergo propter hoc.* In tracing the transition from receptual to conceptual sign-making, Mr. Romanes does not content himself with showing that one follows the other in time. He accounts for the change by reference to a new condition—self-consciousness. It seems to me that the genesis of preconceptual language, both in the individual and in the race, calls for similar treatment. *Homo alalus* requires to be accounted for no less than *homo sapiens.*

We must now consider Mr. Romanes's explanation of the origin of concepts. "The advent of self-consciousness . . . enables mind not only to know, but to know that it knows; not only to receive

knowledge, but also to conceive it; . . . not only to state a truth, but to state that truth as true." Self-consciousness consists "in paying the same kind of attention to internal or psychical processes as is habitually paid to external or physical processes". "A concept in virtue of having been named by a self-conscious agent is an idea which stands before the mind of that agent as an idea, or as a state of mind which admits of being introspectively contemplated." Now, according to Mr. Romanes, animals as well as men possess self-consciousness. In their case, however, and in that of the child before it attains its third year, the consciousness of self is said to be merely receptual. This, as Mr. Romanes maintains, and as he is logically bound to maintain, is not what is required to explain the genesis of concepts. On the contrary, he explicitly states that the kind of self-consciousness required is not receptual, but conceptual. He therefore assumes a full-blown concept in order to explain the origin of concepts. I should not lay any stress on this *petitio principii*, if it were anywhere shown that the concept of self is attainable by a special process inapplicable to other things. But the concept of self does not appear to be privileged in this way. The process by which Mr. Romanes accounts for its origin is in all its essentials equally applicable to all external things which are capable of being classified and which exist in a variety of changing states.

I am not sure that I quite understand the part played by self-consciousness in Mr. Romanes's theory. He asserts with almost wearisome reiteration that all judgment, in the strict sense of the word, involves a consciousness of ideas and of the act of judging, as states of our mind. Now this does not seem to be true of any judgments excepting those which relate to psychological subject-matter. We seem to be here confronted with the same fallacy that Mill has exploded in bk. i., ch. 5, of his *Logic*. I cannot do better than repeat Mill's words: "In order to believe that gold is yellow I must indeed have the idea of gold and the idea of yellow, and something having reference to those ideas must take place in my mind: but my belief has not reference to the ideas, it has reference to the things". It is true that in order to judge we must be conscious of what in point of fact are ideas; but why should we be conscious that they are ideas? If Mr. Romanes were right, the professional psychologist would be on an immensely higher intellectual level than his fellow-men. For he alone is in the habit of attending to his own mental processes by an "introspective act in the light of self-consciousness". Unhappily this view does not seem to be borne out by facts. Attention to the process of judging rather tends to distract attention from the import of the judgment.

Mr. Romanes formulates his central doctrine in various ways. He seems to me to be specially unfortunate when he asserts that, though we may state a truth apart from an accompanying act of introspection, we cannot apart from such an act state a truth as

true. I may have misapprehended Mr. Romanes's meaning; but, as I understand him, he appears to be accurately wrong. Just in so far as we consider judgment as a mental process, we leave out of count its truth or falsity. The act of judging is the same whether the import of the judgment be a fact or a fiction.

Mr. Romanes treats the distinction between subject and predicate as having no real bearing on the genesis of conceptual cognition. He thinks that, when once a coindative name is intentionally applied, a concept straightway comes into being, and that combination of concepts in the form of judgments follows as a matter of course. He does not seem to be aware that on this point he is at variance with a most competent authority, who has expressly considered the question with the utmost care. Prof. Steinthal, in an early stage of his life-long investigation of the nature and genesis of language, held views similar in this respect to those of Mr. Romanes; but he afterwards found himself compelled to take up an entirely different position. In his masterly work, *Einleitung in die Psychologie und Sprachwissenschaft*, there is to be found a most able and careful investigation of the growth of the judgment, in which subject and predicate are definitely distinguished. This step in the development of thought is according to him of the utmost importance, because through it, and it alone, does it become possible to explicitly apprehend an individual thing as identical with itself throughout the vicissitude of its changing states. In other words, it is only by such judgments that we are enabled to conceive an individual as a subject embracing within its unity a plurality of predicates, which express its varying phases of action and passion. Now if Prof. Steinthal is right, Mr. Romanes is hopelessly wrong. His whole theory is ruined if the concept of self implies the distinction between a subject and its manifold predicates. In any case it is a serious shortcoming on the part of Mr. Romanes to have ignored in this manner some of the best work done by his predecessors, while taking so much account as he does of unimportant work like Prof. Max Müller's and Ludwig Geiger's.

After all this hostile criticism it is right to add that I have derived pleasure and profit from this book, and that I consider it well worth reading. The problem which the author essays to solve is an immensely difficult one, and he has not, I think, attacked it successfully. But the memorable thing is that he has made the attempt. It is to his credit that, in dealing with so slippery a subject-matter, he has attained to such a degree of clearness as to raise in the mind of his reader a series of definite objections instead of a feeling of vague dissatisfaction. It might have been more difficult to find fault with an inferior book.

G. F. Stout.

Physical Realism: Being an Analytical Philosophy from the Physical Objects of Science to the Physical Data of Sense. By THOMAS CASE, M.A., Fellow and Senior Tutor, Corpus Christi College, &c. London: Longmans, Green & Co., 1888. Pp. 387.

Mr. Case's Essay, if it does not prove, as it is meant to do, that the whole of modern philosophy, with the exception of "natural philosophy" has been an aberration, is nevertheless a contribution to philosophical discussion from which much can be learnt. In the first place, the author gives a clear and correct view of the history of modern idealism. The Berkeleyan theory of the external world, he shows, is the logical result of the development from Descartes through Locke, and the Cartesian starting-point, again, is that which was logically necessary after the development of the theory of the soul and of perception by ancient philosophy. The admissions implied in this view are not less important because the author holds them to constitute an argument that the starting-point of modern philosophy, so far as it was subjective, was wholly wrong. Nor is Mr. Case in detail so undiscriminating an opponent of idealism as might be inferred from his general position. If, in his view, we directly perceive a "physical" world, we do not directly perceive an "external" world. The appearance of externality in the object of immediate perception, according to the theory of "Physical Realism," is an illusion. To take up this position is, of course, to disclaim all appeal to the "evidence of consciousness" apart from scientific, if not also philosophical, interpretation. The name the author gives to his doctrine might, indeed, be expanded into 'Realism on the basis of Physical Science' (and not merely realism as implied in scientific assumptions); the doctrine he opposes being defined correspondingly as 'Idealism on the basis of Psychology': though, having once admitted the relevance of physiology, for example, to the question of perception, he does not find it possible entirely to exclude psychological considerations. The second great merit of his treatment, after the historical view, is the definiteness with which he puts the philosophical question whether physical science with its "intelligible world" of invisible corpuscles and vibrations can be rationally explained by a doctrine for which the "being" of external things is simply "being perceived".

The author, like his realistic predecessors of the common-sense school, finds the origin of modern idealism in a single questionable assumption of Descartes,—namely, that we perceive immediately 'ideas' which are produced by the action of the object on the soul, and that we only mediately infer the object. Once accept this theory of 'ideas,' and there is no logical escape from absolute idealism. "If all the data of a man's knowledge were his soul and ideas, he could know nothing but other souls and ideas." Yet the common-sense school was

wrong in maintaining that what we perceive immediately is the external object. The object we immediately perceive is "physical" but "internal". It is some part of the nervous system as affected by modifications produced from without. That which is perceived being physical and not psychical, it is allowable to infer other physical, and not merely psychical, objects from the object immediately perceived. From the modifications of the nervous system we infer their external causes; and in ordinary perception inferences are so conjoined with direct perceptions that the illusory appearance arises of a direct perception of external objects. This doctrine of perception to which we have to return in order to escape from idealism is that of the ancient Atomists. The Atomists did not, indeed, present their doctrine in a quite unexceptionable manner, and of course it had scientific imperfections; they supposed external things, for example, to act on the organs of hearing, sight and temperature by emissions instead of by vibrations; but they had hold of the essential truths that the "immediate object" is "not the thing at a distance, but the result of the thing on the organs of sense," and that, "though internal and representative," it "is neither immaterial nor psychical: it is a physical object". The atomistic doctrine of perception is realistic, but not necessarily materialistic, and is compatible with "theological," though not with "psychological," idealism. Matter may have an existence that is not spiritual, and may yet have been created by a spirit. For the theory of perception, the defect of materialism is neglect of "the latent factor in all thinking, the soul". "The thinking subject is man, thinking partly by his body, that is, his nervous cerebral system, and partly by a latent factor, his soul, co-operating, as by the composition of forces, in every operation."

At the ground of this theory of perception there is a psychologically justifiable conviction of the special intimacy of the consciousness of the body. As a proof that "the body is a patent factor of the thinking subject," the author urges, for example, the facts of organic sensation (pp. 110-12, 134-5). These facts, however, are not sufficient to support his theory. When it is considered that the data of sense that we assign to the body are just as capable of psychological expression as those that we assign to the external world, the whole argument in favour of realism from the knowledge we have of the body loses its force. But let us examine the atomistic doctrine more directly. According to the author, we see "the extended in the optic nerves," we feel "the extended in the tactile nerves" (p. 250). "The hot felt is the tactile nerves heated, the white seen is the optic nerves so coloured" (p. 24). "It is true that red refuses to appear to our senses as a motion representing the external motion which produces it. But the cause of this fact is to be found in the construction of the optic nerve, which, when acted on by a certain imperceptible motion of ether,

receives a sensible colour apparently unlike motion, just as oxygen and hydrogen in certain proportions, when acted on by electricity, become water. In the same way, when a wheel rotates too quickly, the sensible effect ceases to be a motion, because the nerves are insusceptible of taking on so rapid a motion in sense. The sensible effect is similar or dissimilar to the external object, so far as the nervous system is capable or incapable of being affected similarly to the external object" (p. 31). The meaning of these assertions, if we are to retain the atomistic theory, must be that when we perceive clearly the motion of the corpuscles of the nervous substance, we have a perception of extension or motion, but that when the vibrations impressed on it by the ether are such that we can only perceive them confusedly, then the confused perception of the vibrations is what we call a perception of a heated or coloured surface. Now the mere consideration that a sensation of colour or heat, whatever may be its cause, is psychologically *sui generis*, shows at once the inadequacy of atomism, by itself, to explain a perception involving heat or colour as one of its sensational elements. With the beginning of psychological consideration the 'idea' or 'phantasm,' in its distinction from configurations and vibrations of material particles, in some form returns. Even in Mr. Case's own theory it returns in a vague form when he says that man is partly "psychical," and more clearly when he says that "the hot felt and the white seen . . . are apprehended by internal sensations of touch and vision" (p. 25). For of course the distinction, made immediately afterwards, of the sensation from its object does not take away the effect of the admission of an internal psychical process. And these are not admissions that are compelled by the author's "theological idealism" and that would disappear from a more consequent "atomism". In his theory of perception, Mr. Case is as consequent an atomist as it is possible to be. Any admissions he makes are extorted from him by the facts. Now it is his own contention that if the "psychical" apparition of the Cartesian or Lockian idea is once permitted to enter, sooner or later the conclusions of Berkeley and Hume must logically follow. The "primary" qualities of matter, under the Berkeleyan analysis, go the way of the "secondary" qualities.

Idealism, however, when formulated as a philosophical doctrine, has to interpret scientific knowledge as well as ordinary perception. Whatever may be its plausibility from the subjective side, the proof that it cannot do this would be, Mr. Case contends, a *reductio ad absurdum*. It is this *reductio ad absurdum* that he undertakes to give. "Man as a natural philosopher," he says, "knows things in themselves which are not phenomena, when he knows imperceptible particles." The assertions of physicists, that atoms have a real and not merely a hypothetical existence, are, for philosophical idealism, meaningless. But the accepted

results of physical science have a higher degree of certainty than any conclusions that can be drawn from the mere subjective data of psychology. The psychological method in philosophy, therefore, since that leads to idealism, is in need of revision.

Mr. Case, however, has himself tried to make this revision; and, as we have seen, the attempt only brings him back to a point where the precise assumptions that have led historically (and, as he admits, logically) to idealism force themselves again upon the thinker. It is clear that a solution of the difficulty is not to be found in accepting the scientific view, any more than the ordinary unscientific view of the object of perception without an examination of it in the light of philosophical theory. Such an examination would remove the difficulty put by Mr. Case. The assertion that atoms are not merely assumed hypothetically in order to facilitate calculation, but have a real physical existence, would be found to mean, philosophically, that the atom is an object of possible though not of actual perception; that under certain conditions, ultimately definable in psychological terms, we should detect certain small, hard bodies having some kind of vibratory motion, which our present sense-organs and microscopes do not enable us to perceive. This, again, means that certain sensations and ideas would follow one another in a certain connexion. What the realist has to show in order to prove his position is that "scientific objects" cannot be wholly resolved into "possible phenomena". Mr. Case, as he tells us (p. 380), has written a chapter, which is in print, to show this at length. When it is published, we shall be able to judge how far he has been more successful than other realists.

In detail, Mr. Case objects against the procedure of English philosophers, that in psychology they make realistic assumptions that are inconsistent with their idealism. This objection is, of course, answered by the distinction that is clearly drawn in recent, though not in earlier, experiential philosophy between psychology (as pure science) and theory of knowledge. As urged by Mr. Case, it does not indicate any leaning to Neo-Kantianism. His chapters on Locke and Kant have a decidedly experiential tendency.

So far, we have not found that Mr. Case establishes anything against the idealistic position. Yet it must be conceded in the end that his arguments do really indicate a weakness of idealism as it is sometimes presented. As expounded by Mill, for instance, in the *Examination of Hamilton*, it is a theory of knowledge with a psychological basis, and nothing more. But when the objects of perception and the objects of science have all been resolved into phenomena, actual or possible, philosophy has further questions to ask. Now science, when it is viewed apart from idealistic theory of knowledge, appears to have answers to give to some of the further questions of philosophy; while philosophy, by stopping short at theory of knowledge as existing in

the individual or even in the social mind, appears to destroy rather than to interpret the answers of science. In this state of things, a not unusual combination of positions is to admit the force of the idealistic argument, to go on effectively thinking of the objects of science as existing independently of all minds and producing them, and, controversially, to avoid all difficulties by a confession of agnosticism. Mr. Case is, as he says of Berkeley, "too philosophical to be an agnostic"; but he does not see that only philosophy, and not special science by itself, can answer questions as to the nature of reality; that, in short, it is only from the philosophical point of view that an ontology is attainable. To become ontology, philosophy must go beyond the theory of our knowledge of phenomena; but the example of Berkeley proves that there is nothing inconsistent with English philosophical method in the attempt to answer ontological questions. Hume's Scepticism and Kant's Criticism have, indeed, made it impossible to continue affirming ontological propositions in the old "dogmatic" manner; but they have not made ontology itself impossible. Hegelianism, for example, whether in its original or in its renewed form, if it is to be rejected, must be rejected not simply because it is "ontological," or on account of its consequences, but because, as a philosophy, it is wrong in method or in principle. Now that the Hegelian philosophy no longer gives satisfaction even to its own adherents, it remains for a philosophy that is psychological in method and experiential in principle to prove its confidence in itself by going back to the perennial questions of ontology. This is the moral of Mr. Case's book.

THOMAS WHITTAKER.

Principles and Practice of Morality; or, Ethical Principles Discussed and Applied. By EZEKIEL GILMAN ROBINSON, D.D., LL.D., President of Brown University. Boston: Silver, Rogers & Co., 1888. Pp. xii., 252.

Moral Philosophy; or, Ethics and Natural Law. By JOSEPH RICKABY, S.J. ("Manuals of Catholic Philosophy".) London: Longmans, Green & Co., 1888. Pp. viii., 376.

These books contain the substance of lectures delivered respectively by a Protestant and by a Catholic theologian to their college-classes, and are intended to facilitate the systematic teaching of Ethics under like conditions. At least the professor of the Society of Jesus evidently seeks no audience without the pale of the Church which still looks up with peculiar reverence to "the teaching of St. Thomas"; and the American divine, whatever his secret aspirations, can hardly doubt that the natural destiny of his book will be fulfilled when it becomes the well-thumbed manual of the aspirant to the office of the Protestant

Christian ministry. The attitude assumed by these two writers on ethical problems is probably fairly representative of the spirit and tendencies of the halves of the Christian world to which they severally belong. Father Rickaby, with his Aristotelian and Scholastic training, is always definite and clear, distrustful of sentiment, with an answer ready for every assailant. Dr. Robinson, in his ambition to be comprehensive, is apt to disregard niceties of thought and expression, but at the same time has a truer, because broader, view of the philosophical aspect of his subject. In his anxiety, however, to be fair to many ways of thinking, he may possibly have overstepped the limits of the ordinary student's power of receptivity and assimilation. To reverse the Queen's hint to Polonius—'Less matter, with more art,' would be no misplaced counsel in his case.

Passing to details, and taking the American text-book first, the right note is struck in the following passage of the Preface:

"But it should not be forgotten that there can be no strict science of morals in the same sense of the word science as there can be a science of physiology, or even of psychology. Strict science fulfils its whole task in simply telling what is. A full account of morals must not only tell what is, which is all that science can do, but, calling philosophy to its aid, it must tell us what ought to be, and why it ought to be. In explaining and justifying the 'ought,' we must have recourse to some of the profoundest principles of which philosophy has any knowledge. A full treatment of morals, therefore, requires that in dealing with its facts our method should be scientific, and in treating of the principles which the facts imply and involve our method should be philosophical."

It cannot, however, be said that the distinction here so well drawn between the scientific and philosophical methods is sufficiently adhered to in the body of the book. The mapping out is as follows: Part i. Essential Principles of Ethics. Part ii. Theoretic Morality: (1) The Moral Faculty or Conscience; (2) Moral Law; (3) The Will; (4) Virtue and Theories of Virtue. Part iii. Practical Morality. Here are all the familiar topics. If, however, the physics is to precede the metaphysics of Morals, one cannot justify a treatment that leaves over a discussion of the functions of the Will until Moral Law has been fully discussed; the consideration of Will, moreover, being interpolated between Moral Law and the Theories of Virtue. Offences against obvious method are not infrequent in the sub-sections likewise.

The constructive part of the book commences with an account of the Moral Faculty. Here the writer takes note of what he deems a grave confusion between Conscience and Moral Consciousness. Our author would restrict the former term to the power of self-judgment, accompanied by self-approval or self-disapproval, leaving the latter term to cover the entire sphere of moral judgments and sentiments whether of personal or alien reference. There may be a convenience in taking the distinction,

but the difference in principle alleged in support of it is not made sufficiently apparent. "In judging others," says Dr. Robinson, "the judgment is consciously pronounced with a disposition to approve or condemn, as the case may require. In judging self, the judgment is both consciously pronounced, and actually, though involuntarily, executed in the accompanying emotions" (p. 55). Is the difference here alleged other than one of intensity, a difference that may even on occasion be reversed?

The chapter on the Idea and Definition of Moral Law is in some parts lax. Thus we are told that "in matter, law is the rule according to which force acts by mechanical and chemical necessity; in mind or soul, law denotes the rule according to which, from motives derived from the requirements of his moral nature, a rational being ought always to act" (p. 86.) The writer has not really in view, what the words imply, barely psychological laws, but rather the dictates of reason as apprehended by a free intelligence. In the chapter on the Sanction of Morals the discretion of silence would have been the better part of valour if the reconciliation of vicarious suffering with the demands of "strict justice" could only be effected by the pleading that "every member of a body, by virtue of his membership, is justly a participator alike in the innocence and the guilt, and so in the rewards and penalties, of the whole" (p. 102).

The author's position on the vexed question of Free-will is sober enough, though the importance of a decision in favour of Libertarianism seems singularly reduced by the statement made in reply to a Determinist objector—"If will express the whole nature, every power working in harmony with every other, then the will is not necessitated, whether its action be virtuous or vicious" (p. 136).

The chapter on the Ultimate Ground of Moral Obligation is penned in a very impartial spirit, the writer's own view being that the source of duty must be looked for in a common nature derived from the "One Original and Father of All," a statement, however, that is capable of adaptation to widely different systems of Ethics. On p. 156 there is a strange slip, where Prof. Sidgwick is cited in the roll of moralists "who make quality rather than quantity of happiness to be the end".

In the practical department, Dr. Robinson follows the time-honoured division of Duty into Duties to God, Duties to One's Self, and Duties to Fellow-beings. There is nothing calling for special remark in this section, where, it need hardly be said, little disposition is shown to depart widely from accepted and traditional opinion.

Despite a tendency to verbosity, in the dearth of ethical manuals these lectures by the President of Brown University might not be found ill-adapted for academic use at the present time.

With Father Rickaby the terms Theoretical and Practical Morality are replaced by those of Ethics and Natural Law, "the principal business" of the former being "to determine what moral obligation is, or to fix what logicians call the *comprehension* of the idea *I ought*," while "it belongs to Natural Law to consider what things are morally obligatory, or to determine the *extension* of that idea *I ought*". The first five chapters of Part i. are in effect an illustrated and glorified edition of Aristotle's *Ethics*. Happiness is the moral end; but then "*Happiness is the act of the spontaneous understanding contemplating for contemplation's sake*". This is not the end of vulgar Hedonism, nor is it an end commonly realisable under the conditions of our short life-term; accordingly our teacher cannot journey far without passing the limits of terrestrial existence. The religious keynote of this Catholic Ethics is thus struck without delay, and one is always hearing the fundamental tone. Dr. Robinson bids us clearly separate our science and our philosophy, but Father Rickaby knows no science of Ethics that is not a philosophy of Ethics, and no philosophy of Ethics that is not a theology of Ethics. No wonder then that he has strong language for "Utilitarianism" or any form of mere mundane Morality. "Altruism, and Utilitarianism with it, ignore the interior life of the soul, and substitute human society, that is, ultimately, the democratic State, in place of God" (p. 182). It is quite in accordance with this view of the matter that the Natural and Moral Law are pronounced "immutable". Thus we are told, "pride is not made for man, nor fornication, nor lying, nor polygamy," and the appeal is made to mathematics: as triangles *quâ* triangles must have three angles equal to two right, so man *quâ* man has his invariable constants. The only evolution possible for him is "psychological" not "ontological". Yes; but who seeks to dispute that? Even that monster the "dogmatic Atheist" has a firm belief in the ultimately fixed "nature of things," and is convinced that there is one, and only one, perfection of man. With objects of the pure intellect there is only one truth possible, whether the cogniser be tiro or proficient, the entities being ideal; but where the matter is real and is subject to continual modification, as in the relations of human beings in society, not only moral notions alter but "right" moral notions as well, for man is no definitely-circumscribed entity like a triangle, but is constituted man through his physical and social relations.

Practical Ethics or "Natural Law" occupies a larger space in the Jesuit teacher's text-book than in that of the American divine. The topics treated of are—Duties to God, Duty of Preserving Life, Speaking the Truth, Charity, Rights, Marriage, Property, The State; on all which the father gives no uncertain sound. This second part of the book seems inferior in many respects to the first part. The reasonings in the former half are always acute and often convincing; but unjustified dogmatism, bitter declama-

tion, even childish credulity, detract from the worth of the second portion. The following is a strange outcome of immutable and eternal Ethics:—

"There is no shadow of evil resting on the practice of causing pain to brutes *in sport*, where the pain is not the sport itself, but an incidental concomitant of it. Much more in all that conduces to the sustenance of man may we give pain to brutes, as also in the pursuit of science. Nor are we bound to any anxious care to make this pain as little as may be" (p. 250).

This passage is characteristic of the general tone of the writer, to whom "pain" seems altogether to be a very small matter, man being, of course, *animal rationale*, with a very marked stress on the adjective.

In the final chapter, on Liberty of Opinion, the writer leaves us in no doubt what we might expect if our Jesuit preceptors were not confined to formulating their views in manuals of Moral Philosophy.

"To pull down the idea of God among a nation of theists, whether by the wiles of a courtly Professor at a University, or by the tub-thumping blasphemy of an itinerant lecturer, is to injure the State" (p. 364); "Such teachings as those which we would have the State to suppress, *e.g.*, *An oath is a folly: There is no law of purity: There is no harm in doing anything that does not annoy your neighbour*, are not the teachings of men sincerely convinced: they deserve no respect, consideration or tenderness on that score. We do not say that the teachers of these monstrosities are not convinced, but that they are not honestly and conscientiously convinced: they have blinded themselves, and become the guilty authors of their own delusion" (p. 368).

This manual is, of course, intended for Catholic use, and probably will be accepted in the quarters for which it is intended. The non-Catholic teacher, accustomed to read and think for himself, will also find many aids to reflection, but he will be scarcely desirous of naming it as a text-book for his classes.

W. C. COUPLAND.

Psychologie de l'Attention. Par TH. RIBOT, Professeur au Collège de France, &c. Paris: Félix Alcan, 1889. Pp. 182.

Prof. Ribot has undoubtedly struck out a new line by his series of psychological monographs. And there is a good deal to be said just now for such a separate treatment of particular branches of the subject. As the author has shown us in his interesting little volumes on Memory, Personality and Will, the recent researches of physiologists and pathologists have served to throw a new and valuable light on special portions of the psychological field; and it is just as well that the psychological student should be put in possession of the results of this inquiry as soon as possible. This

is the special aim and the *raison d'être* of these volumes. At the same time one looks in a trained psychologist like M. Ribot, who is a student of the new and exacter methods of German psychochology, for a clear discrimination of the psychological from the physiological problem. That this discrimination was not always as clear as it might have been in the earlier volumes did not, perhaps, greatly matter, since these were avowedly occupied with the pathological side of the phenomena discussed. But in the present volume Prof. Ribot distinctly declares that he is going to treat of the *psychology* of Attention, and the reader may therefore be forgiven for feeling a little disappointed that the volume is for the most part confined to an analysis of its physiological conditions. Nobody will say that these are unimportant, but it is only too easy to give an exaggerated psychological value to them. And this, it will probably seem to many readers, M. Ribot is throughout disposed to do. He appears to think that the main problem of Attention is disposed of when it is shown that this psychical phonomenon is accompanied by the excitation and by the inhibition of movement. The point of view from which he looks at Attention is pretty clearly indicated in his insistence on the fact that Voluntary as distinguished from Spontaneous (non-voluntary) Attention is "artificial" and even "abnormal". The meaning of this seems to be that voluntary attention only manifests itself when the conditions of civilised life are present, and, since it always involves a peculiar drain on the nervous energy, is not capable of being long sustained at any one time. Here, in his antagonism to introspective psychology, which by the necessary conditions of its inquiry attaches most value to the developed human consciousness, M. Ribot appears to have been driven to the opposite extreme. For him the precise function of attention in the complex processes of our mental life, its relation to retention, to the association of psychical elements, its action in the operations of thought,—all is passed over as though it were of little account. What is of supreme importance is that attention on its physiological side is always a motor process, and that in its earliest and "natural" form it is bound up with the necessary conditions of life.

While, however, the student may thus feel disappointed at the meagre psychological outcome of this psychological study, he will be certain to find it like all the author's writings freshly conceived and vigorously and clearly expressed. It opens with an introduction in which an attempt is made to define Attention. Attention, we are told, is always the substitution in consciousness of a unity for a plurality: it is a tendency to monoïdeism. Ordinary consciousness is characterised by a multitude of elements and constant changes: attention arrests this flux, and introduces momentary fixity. But feeling also, *e.g.*, toothache, can effect such a momentary unity of consciousness, and this is not attention, for this last is intellectual and directed to an object, that is,

as it seems, a presentation. After this M. Ribot takes up the natural form, Spontaneous Attention, and shows in an interesting way how it depends on emotional states (*états affectifs*). The motor concomitants are then described. This account of spontaneous attention is followed by a chapter on Voluntary Attention. Here, as in the earlier form, the law of dependence on feeling holds good. This higher form becomes possible in so far as we "render attractive by artifice what is not so by nature, or give an artificial interest to things which have not a natural interest". Here the author brings out in an interesting manner the fact that voluntary attention, as seen in the power of prolonged occupation or work, is confined to civilised man, and is a product of the social and educative influences which constitute civilisation. The distinguishing physiological characteristic of voluntary attention is Inhibition, and thus the author is naturally led to sum up some of the results of recent investigation into this difficult subject. In connexion with this inquiry into the physiological concomitants, he discusses, though rather hurriedly, the question whether attention to all intellectual objects, presentations and representations is effected, as Dr. Bain affirms, by means of a control of the muscular element in these. M. Ribot decides that this is the mechanism at work in all cases, but the question is a complicated one, and a fuller reference to views on the other side, as those of Prof. Wundt, would not have been out of place here. To this account of Voluntary Attention is added a chapter on the pathology of the subject. The essence of Attention being a tendency to "monoïdeism," we may have (1) a hypertrophy of Attention where this unity of mental content becomes absolute, or (2) an atrophy of Attention where the flux of changing states is uninterrupted. The first covers a number of cases from *idées fixes* up to ecstasy. The second, too, includes a variety of phenomena, from the inability to fix attention in states of exhaustion up to the turmoil of ideas in madness. This chapter is, as might be anticipated, particularly interesting.

There is one part of the subject which M. Ribot seems to have left in a certain obscurity, *viz.*, the relation of Feeling to Attention. On the one hand, as we have seen, he insists with particular emphasis on the general dependence of attention on feeling. On the other hand he refuses to call the complete occupation of consciousness by toothache a case of attention at all, and in dealing with *idées fixes* he excludes from view those due to emotional excitement as not illustrating his point, *viz.*, preternatural intensification of attention. This way of delimitating the area of attention strikes one as somewhat artificial. It is a little difficult to understand what is meant by saying that an all-compelling pain like toothache excludes attention. Are not our minds said to be engrossed with the pain, and would not this preoccupation become at once evident if our attention happened for a moment to be directed to something else? Similarly, it

may be said that to distinguish between emotionally sustained and other *idées fixes* is arbitrary. In every case of *idée fixe* (*e.g.*, the *Grübelsucht* or preoccupation with some abstract problem referred to by the author), one can see that the persistence of the idea is due to an emotional cause, as here a feeling of anxious or morbid inquisitiveness. And it is obvious that in the case of the most inflammatory *idées fixes* the attention is engaged. Indeed, may we not say that in this case attention is raised to its highest power through the exceptional intensity of its stimulus, *viz.*, feeling? What appears to make M. Ribot hesitate to bring this phenomenon under the head of Attention is, of course, the fact that here attention is, so to speak, taken by storm. But this is only a special case of what is common to all non-voluntary attention, *viz.*, the determination of activity towards a particular mental content by an element (or concomitant) of this content, and not by an extraneous psychical stimulus, as in the case of voluntary attention. Another reason for the author's excluding these phenomena from the category of Attention is no doubt his limitation of this last to intellectual states. He does not, indeed, hesitate to call attention itself an intellectual state. But even this is not inconsistent with attention to toothache; for we may hold with Mr. Ward, whom, in confining attention to intellectual objects (presentations), M. Ribot, unknowingly as it would seem, follows, that even in such states of emotional agitation there is an element of presentation. Or we may perhaps distinguish two kinds of attention, the one directed to presentation as such and the other to feeling as such, though, of course, in its connexion with, and to some extent through, the medium of the presentative element to which it is attached. Perhaps M. Ribot may think all this kind of criticism rather subtle, but it may at least serve to suggest what a number of difficult psychological questions group themselves about the subject of Attention.

JAMES SULLY.

Moralphilosophie gemeinverständlich dargestellt. Von GEORG VON GIŻYCKI. Leipzig: Wilhelm Friedrich. Pp. viii., 546.

That a transcendent or mystical character is natural to German thought has perhaps been too hastily assumed. It is undeniable that the most extraordinary German performances in Philosophy have hitherto been of such a kind; but, if when these were achieved the nation had not yet reached the maturity of its powers, if its practical energies had not yet found a sufficient career, a very different kind of speculation may seem good to it hereafter. Some have supposed that the strong feelings of the Germans inclined them to mysticism; but this is often the case with a boy whose mind afterwards takes another cast. The

stronger a man's feelings, indeed, the more likely is he, under the instruction of experience and under the pressure of business, to turn at last to matter-of-fact, and to covet the exactest and fullest knowledge of it, as the only guide to the satisfaction of his ardent hopes and the only refuge from error and remorse. It may be the same with a nation. Hence the prodigious activity of the Germans in every branch of physical, philological, historical inquiry, in the whole region of matter-of-fact, and their achievements there; whereas in metaphysics, in the great age of their philosophers, they were, to tell the truth, far more enthusiastic than successful. It is the glory of the Germans, said Matthew Arnold, to have sought out the facts upon every subject. We see that even in Psychology they have applied the method of observation and experiment with far greater elaboration and thoroughness than our own thinkers, who may be said to have originated it. And it seems probable that in the whole region of philosophical reflection they will, in spite of tradition and the prestige of shining names, entirely alter what are still considered to be their characteristic habits of thought.

The above work may be regarded as one among many signs of such a change. It is in fact an exposition and defence of Utilitarianism, with such modifications and expansions of that doctrine as seem to the author to be necessary to its acceptance and influence. An English reader cannot help feeling some complacency in the use Prof. v. Giżycki makes of the English moralists. He has studied the whole series of those sensible and observant writers, by one or other of whom almost every possible aspect of ethical philosophy has been presented, and he cites from time to time almost every well-known name from Hobbes to Sidgwick and Leslie Stephen. Like the greater part of these his predecessors, too, he addresses not merely the learned, but every serious reader. Moral philosophy, he says, "is a science for everybody". Indeed, if it concerns one more than another, it must be the man-of-the-world rather than the student or professor: the man-of-the-world, by whose acceptance or neglect every moral doctrine must at last become fruitful or futile. To forget this is the Nemesis of the domineering scholarch and of the scholastic coterie, whose capricious inventions for the guidance of mankind require more than human ingenuity to explain and still more to make good the explanation,—heard at first with eagerness by docile youth and often repeated with the unconscious emphasis of half-conviction, but making no impression upon the world and dying away at last in faint reverberations along the roofs of innumerable sleepy class-rooms.

We have here a work on the first principles of Moral Philosophy: it does not attempt to pursue the subject far into its ramifications, nor to apply it to casuistry. After explaining the grounds of the doctrine that the criterion of right conduct is its

tendency to promote the general good, welfare or happiness, the author goes on to meet the various objections that have been raised against it. He discusses in a practical and convincing way the positions that the notion of Happiness wants exactness, that we have not time to calculate the consequences of our actions, that we are liable to all sorts of bias and error in making such calculations, with many others, and finds that none of them is really discouraging. To the proposal to substitute for Happiness the physical welfare of the human race as the criterion of right and the end of endeavour, on the ground that such is the aim of Nature, he replies that Nature, properly speaking, has no aim, and therefore we cannot borrow one from her. This portion of the work, comprising chaps. i., ii., closes with an examination and refutation of the pessimistic doctrine, that there can be no happiness in the world worth striving after.

Having shown that the Greatest Happiness is the criterion of right conduct, he begins in chap. iii. to discuss the end or object of life to the individual. And first he takes up the theory of Egoism, and endeavours to prove that Self-interest is not an end that can be substituted for the Greatest Happiness as the criterion of right, because it is intrinsically unreasonable, and in fact a man by no means always follows it but often acts for public ends or from sympathy. Neither is Self-interest, he says, a motive that can be trusted to shape our conduct according to Right as determined by the criterion of furthering the Greatest Happiness; since the dictates of Self-love, even when most enlightened, do not always coincide with such a rule of Right. None of the sanctions, physical, legal or social, can be relied upon always to turn us from by-ends into the straight way: they may all misdirect us by making it our interest to do wrong. Only the moral sanction, the peace of mind that comes of devoting ourselves to the welfare of mankind, will always lead us aright; but this may not compensate the evil results of right conduct to the individual. Self-interest, then, cannot be the moral criterion nor the end: Morality involves self-sacrifice.

Nevertheless, whilst regarding the Greatest Happiness as the criterion of right conduct, our author does not consider it to be the best end for the individual to set before himself, nor the best motive to rely upon for securing right conduct. Such a motive, he says, is too weak; and he prefers the view of Dr. Coit (MIND No. 43), that whilst the Greatest Happiness is the criterion of right conduct, the true End for the individual is the sense of having done his best to attain that Happiness, and the consequent peace of a conscience void of reproach. For this is all he can be sure of attaining. After his utmost efforts to further the general welfare, want of power, miscalculation or physical accident may disappoint his plans, and leave him with the bitterness of failure. But in such case he may still have succeeded if his object was to do his best. To do our best, then, is the more attainable end, and therefore the more encouraging: it promises

an inward joy that neither the malice of evil men nor the prospect of death can deprive us of. And to such success, says Prof. v. Giżycki, a man has a reasonable claim, since he cannot be expected to live entirely for the sake of others.

This section seems to me the least clearly conceived in the whole work. Our author, in proposing the consciousness of doing right as the moral End, cannot really mean to make it a substitute for the general good as the End, as we may infer both from some occasional expressions and from the form of imperative in which he embodies it: "Seek peace of conscience in devoting yourself to the welfare of mankind". For to devote ourselves to the welfare of mankind is to make that our End; so that peace of conscience is only a concomitant of that mode of activity, and only a part (our own peace, a very small part) of the total good. What then is gained by thus limiting our aim? For my own part, I do not greatly value any of these cunning maxims of moral marksmanship that direct us to aim at one thing in the hope of hitting another. We cannot expect to allow for all the winds of accident in these gusty days of our pilgrimage. Straightforward! is itself no bad ethics. Why diplomatise with fate, or try to circumvent the *Summum Bonum?*

Prof. v. Giżycki's reasons for this are not convincing. In recommending peace of conscience as the End, because it is less likely to be missed, and therefore less likely to occasion disappointment, there seems an undesirable lack of the Stoical temper, which is as necessary to morals as the Epicurean reasonableness. Certainly the Utilitarian cannot at present hope to see the *Summum Bonum* in its full accomplishment: he must of course, for the most part, live by faith, like other good people. But neither must we overrate the amount of happiness that peace of mind confers. No doubt it is the greatest consolation we have when our efforts fail, but consolation is the most we can expect of it: it will hardly amount to joy if failure is disastrous. There must still remain the distress of sympathy with those whose rescue we have pursued in vain, perhaps indignation at those who have frustrated our efforts, with resentment of the shortness of our own resources and of the random courses of the world.

It is true, as the author says, that man has a deep, inward yearning for some kind of happiness, and that the individual has his rights. But will a quiet conscience appease that yearning, or satisfy the individual's claim as a citizen of the world? Part of that yearning is sensual, and this must have its satisfaction in kind according to any tolerable system of morals. And among the individual's claims I reckon this—not to be always engrossed with the Greatest Happiness, but to have a little moral holiday, when he may amuse himself with anything that is harmless. Now such claims as these (to be determined, of course, in their general scope and nature with reference to the common good) are as necessary as a quiet conscience to the great majority of man-

kind; and they harmonise well with the universal end, because they have the same great complex, spontaneous and unexclusive character. One kind of feeling cannot be made the sole end of our manifold nature: a personal end can only be a part of the universal and an epitome of it. Moral culture alone for the sake of Happiness must at last (could it be endured so long) dry up the sources of Happiness. But let us hope that men will not so engross themselves with the warfare of life as to forget to prepare a festal robe against the day of triumph.

On the whole, to make peace of conscience the individual's aim seems to me too much like a compromise between Utilitarianism and all sorts of pædagogic ethics. A great merit of Utilitarianism is to get rid of the authoritative, didactic, superior tone inseparable from most other systems, and to be instead a science of the co-ordination of men's natural desires and impulses, by whose light they may live, as decent people really wish to live, with the least possible collision and waste of effort. But here we find another attempt to impose upon mankind an End that is only a small part of their real End. How can philosophers have the audacity to set out upon such enterprises? 'Has nature been so niggardly to man as to make him barely two-legged,' and leave him without an object in life? Or do they expect to argue him out of his five senses?

Conscience, certainly, is one of our natural impulses; but it is matter of common experience that, in seeking strength to live, too frequent recourse may be had to Conscience; and though much happiness depends upon its satisfaction, there is nothing so hard to satisfy, especially if much indulged. For then, like other faculties, it is liable to morbid growths, and scrupulosity of Conscience is good neither for a man nor his neighbours. If peace of Conscience were made the individual's sole end, I believe it would be as little attainable as the Greatest Happiness, and much less common than it is now. Is it wise to lay all the stress of life upon one moral power (as Kant did) and neglect the rest? For in fact we see that men are made good and useful citizens not merely by force of Conscience, but also by other feelings, many of them natural allies of Conscience, as by love and friendship, by honour and the hope of fame, nay, even by emulation and pique, by pride and vanity.[1] The doctrine that explains the acquisition of our bodily organs by their utility applies also to those impulses of the soul: they are the goads of nature continually pricking us here and there and driving us blindly along; but none of them can be safely blunted. It is not for the philosoper to bid us dispense with any of them, but to show us the use and meaning of them all. They all have their place, and, according to measure, their satisfaction is good. As

[1] Upon this matter much may be learnt from Mandeville, if we read to interpret and not merely to refute him. To refute a philosopher is the worst use we can put him to.

to regard for the Greatest Happiness, though (as Prof. v. Giżycki says) generally a weak, it is often a real, power, and by education, political institutions and other means of improving character (an essential part of practical philosophy little studied) it may be indefinitely strengthened. And the very contemplation of the universal End, the habit of keeping before our eyes the direct consequences of our actions in the pleasure and pain of others, is morally improving.

In the fourth chapter, on Duty, we find the conception of Right, the relations of Feeling and Reason to Moral Philosophy, and the nature of Moral Laws discussed in a way that, again, may not be satisfactory to some Utilitarians. By Right and Wrong our author understands whatever does or does not agree with an acknowledged rule of conduct. Such rules are collected, he says, by reasoning; but the facts from which they are drawn are a particular class of feelings, the moral feelings, namely, of approval and disapproval, honour and contempt, peace and remorse of conscience; and these feelings are the ultimate grounds of ethics. Now, that such feelings are at present the most important of all to moral action is, of course, admitted; they are also essential elements in our judgment of the character of a moral agent. But are they the true foundations of Moral Philosophy? I am surprised to find a Utilitarian affirming it. True that our moral feeling may generally be interpreted as tending to secure the Greatest Happiness; and this is one reason for assuming the Greatest Happiness to be the End of human action; but it is not the only, nor the ultimate, reason. As I understand the matter, we assume the Greatest Happiness to be the End, because we find, in fact, that the Happiness of ourselves and others is for most of our life the direct object of desire, and the indirect object of many other feelings besides the specially moral, such as our concern for health or wealth, which sometimes are immediate ends. (I omit the consideration of what may be called external indices of moral conduct, such as the physical and biological of Mr. Spencer.) As for the specially moral feelings, they at first present themselves along with the great social and political machinery (necessary, no doubt) for frustrating our spontaneous desires; and it is only by some subtlety and adroitness of interpretation that this machinery, and with it the moral feelings, can be shown to tend on the whole to secure the greatest satisfaction of our spontaneous desires, and thereby the Greatest Happiness. But there are many exceptions to this general tendency of the moral feelings, as well as of the rest of our civilising machinery, and the chief use of the Greatest Happiness principle is to correct both that machinery and the moral feelings, when by some mal-adjustment they needlessly restrict our actions and impoverish our life. How, then, can the moral feelings be the ultimate grounds of ethics? Such grounds are, indeed, to be sought in our feelings, but in the whole of them, not in a mere selection.

Here, indeed, as in treating of the personal End, our author makes, I think, a fallacious abstraction of human nature. He seems to set up for Moral Philosophy (like many others) a sort of Moral Man, corresponding in some sort with the Economic Man who cuts such a figure in the Science of Wealth. But the cases are not parallel. For that whose production and distribution are treated of by Ethics and Politics is the total Good, from which no abstraction is permissible, as by making moral peace the End; whereas Economics deals only with Wealth, or one condition of Good. Again, those activities of human life that are concerned with Wealth are to a great extent separable from the rest, and we are urged to them by feelings that may to some extent be considered separately; so that in this case abstraction, judiciously guarded, may be a legitimate scientific artifice: whereas the Greatest Happiness is dependent, not upon a separate class of activities, but upon all, and upon all our feelings and impulses; so that Moral Philosophy deals with phantoms, unless it treats of the co-ordination of all our impulses in relation to the total good. There is, indeed, another way in which Ethics, like Political Economy and every other science of causes, must resort to abstraction, I mean in attempting to eliminate the tendency of a given action in relation to Happiness, from the tangle of circumstances amidst which it operates; but of this hereafter.

The conceptions of Ought, Duty, Law, says Prof. v. Gižycki, all referred originally to something outward and heteronomous, and attain to an inward and autonomous meaning only for the completely developed human being. But (it may be asked) do not all these conceptions need a thorough-going reconstruction in Utilitarian Ethics? Moral law, says our author, is different both from natural law and from the law of the State: from the latter, because it does not need another to lay it upon a man; he lays it upon himself, being autonomous. Now, surely, this figure of speech from Kant's imposing moral rhetoric sheds no light upon our subject. Is it not better in Utilitarian Ethics to regard all moral laws as natural laws describing the means to a certain end, *i.e.*, the causes that tend to produce a certain effect, namely, Happiness, which, according to this philosophy, is the natural End of human action, or that which best co-ordinates our spontaneous impulses? Thus: to speak the truth tends to Happiness; to give each man what he has paid for tends to Happiness; and so on.

I am sorry to see that our author emulates Kant by formulating a categorical imperative: "Act so that your conduct shall conduce to the welfare of mankind in general". Whence is the imperative form derived; or, if it is the nature of good men to act so, where is the need of the imperative; or, if it is not their nature, what avails it? For men who are not good, who do not desire to know and do what is right, the moral philosopher, as such, can do nothing. He must leave them to the legislature, to

the public censor, to the moral rhetorician, and to the vengeance of nature. In Utilitarian Ethics, at least, all imperatives are hypothetical, being conditional on the acceptance of the End. To anyone who adopts the End, the laws of the Science may be presented thus as rules of Art: since you desire the Greatest Happiness, speak the truth. But the End itself cannot be thrown into an imperative. And such terms as 'Ought,' 'Duty,' in pure morals, apart from external sanctions, have, of course, a corresponding explanation. Their imperative tone is due to their outward and heteronomous origin, and it gives them great rhetorical efficacy.

Conceiving of moral laws as natural laws, Ethics takes (as observed above) the same general form as other sciences of causation, and may be compared with Political Economy as a science of means to a certain End. The numerous cases in which a means may fail to attain the given end need not then be interpreted as exceptions to an imperative rule (a treatment that raises peculiar difficulties in Ethics), but as instances of the counteraction of one cause by others: as when truth told to a highwayman does not lead to the Greatest Happiness, because he takes a mean advantage of it. The body of most general moral laws, considered as natural laws of the tendency of conduct, constitute the 'Absolute Morality' of Mr. Spencer, which he describes as only fit for the ideal society; that is, for a state in which moral friction, or the interference of causes, is reduced to a minimum. This may be compared with that abstract Political Economy that is equally good for Saturn and our own planet. Relative Morality is the study of the probable effect of conduct in our actual circumstances, considering more or less the conflicting causes. Prof. Sidgwick, in bk. iii. of *The Methods of Ethics*, shows how far Common Sense has darkly pursued this inquiry. In no case, however, do we meet with exceptions to the primary laws, considered as statements of the tendency of Truth, Honesty, &c., to produce Happiness. In this sense such laws belong to eternal and immutable morality.

I have lingered over these third and fourth chapters because they contain doctrines more likely than the rest of the book to raise some difference of opinion amongst Utilitarians. In the fifth chapter the author expounds the notion of Virtue. In the sixth and seventh he shows, with much force and lucidity, that Morality rests on the law of Causation, and he examines the bearing of this law on the notions of Freedom and Responsibility. The remainder of the book is occupied with a lengthy investigation of the relation of Morality to Theology and Nature. The temper of these discussions is admirable: nothing could be more explicit, nothing less offensive to any reader who may come to them with prepossessions out of harmony with the author's conclusions. Their extent, however, precludes me from giving any account of them here.

CARVETH READ.

VII.—NEW BOOKS.

[*These Notes (by various hands) do not exclude Critical Notices later on.*]

Natural Inheritance. By FRANCIS GALTON, F.R.S. London: Macmillan & Co., 1889. Pp. x., 259.

"The inquiry of which this book is the result relates to the inheritance of ordinary qualities by successive generations of a people, and it is carried on by more refined and searching methods than those usually employed. It is based on the fact that the characteristics of any population which lives in harmony with its environment remain statistically identical during successive generations. It was easy to see in a vague way that an equation admitted of being based on this fact; also that the equation might serve to suggest a theory of descent, while no theory of descent that failed to satisfy it could possibly be true. A large part of the book is occupied in putting this equation into working order; in the course of which operation numerous obstacles had to be confronted in turns, and then to be either evaded or overcome. The final result was that the higher methods of statistics, which consist in applications of the law of Frequency of Error, were found to be eminently suitable for expressing the course of heredity. By their aid the desired equation was thrown into an exact form, and it became easy to compare its various consequences, obtained through calculation, with the observed facts. In all cases the results proved to be consistent. The nearness of the various degrees of kinship was incidentally determined with numerical precision, as well as the average contribution from the personality of each ancestor to the total heritage of the child, as distinguished from what he might transmit in a latent form. Much insight was also obtained into the proportion between the latent and the personal elements in each individual. In the preliminary chapters relating to the processes of heredity, new light was thrown on the tendency of some elements to become blended in descent, and in others to be mutually exclusive; also on primary and secondary orders of typical stability; on the infertility of mixed types, and on numerous other topics." Critical Notice will follow.

Letters of David Hume to William Strahan. Now first edited with Notes, Index, &c., by G. BIRKBECK HILL, D.C.L., Pembroke College. Oxford: Clarendon Press, 1888. Pp. lv., 386.

This collection of Letters from Hume to the printer of his works from 1756 onwards—saved from dispersion by Lord Rosebery's purchase—is edited with the same singular care, almost exhaustiveness, that Dr. Birkbeck Hill has before brought to bear on Boswell's *Johnson*. The Letters, over 80 in all, are treated in consonance with a notion of Hume's own that "every book should be as complete as possible and should never refer for anything material to other books". Libraries would assume a different aspect if the rule were universally followed; but it is very well that it has been observed in the present case. The amount of illustrative matter, as interesting as it is pertinent, presented with the Letters, renders the volume the first indispensable supplement to our knowledge of the great sceptic that has appeared since Burton's *Life and Correspondence of D. H.* in 1846. It is the man or the man-of-

letters, far more than the philosopher, upon whom additional light is thrown; for the philosophical works, except the *Dialogues on Natural Religion*, had all appeared before Hume came into relation with the worthy and intelligent Strahan. We get, however, most curious indications of his unremitting anxiety, till within a few days of his death, to make as perfect as possible the general collection of *Essays* with which from 1757 he incorporated his two philosophical *Enquiries* (that superseded for himself all that he had done in his youthful *Treatise*). Otherwise the Letters disclose a good deal that is new about the posthumous publication of the *Dialogues on Natural Religion*. Dr. Hill, by subjoining various letters from Adam Smith and others (some of them not before published), can hardly have left anything to be added to the story of Hume's dying concern for that work of his maturest powers. While there is so much to thank the editor for, one must note in him a curious disposition to insinuate things to Hume's disadvantage, and, in particular, to magnify the import of the sweet-tempered philosopher's solitary lapse from perfect equanimity (away from the ground of politics or national feeling) throughout a correspondence of twenty years.

Life of John Stuart Mill. By W. L. COURTNEY. ("Great Writers.") London: Walter Scott, 1889. Pp. 194, xii.

This short *Life* adds nothing to what was already known of Mill, but is conceived on the whole in a notably appreciative spirit. It ought to have the effect of sending the reader back to Prof. Bain's *John Stuart Mill* (1882), which, with the same author's *James Mill*, supplies to Mr. Courtney most of the personal facts that he knows outside of Mill's *Autobiography*. He makes, however, effective use besides of the interesting particulars regarding Mill to be found in *Caroline Fox's Journals and Letters*, and extracts are given from a striking judgment by Mr. Gladstone (written for this *Life*) on Mill's parliamentary career. Where Mr. Courtney, who has before occupied himself with Mill's philosophy (see MIND iv. 421), chiefly fails is in familiarity with its sources. For example, if he is one of "those who have read Hartley's *Observations on Man*" (p. 21), he must have a little forgotten it, when remarking on James Mill's *Analysis* in comparison with it; and, at page 77, there is the old want of discrimination, when Mill appears to be connected as much with Hume as with Hartley. One other point may be noticed. Mr. Courtney does not omit to mention, after Prof. Bain, the article on Whately's *Logic* in the *Westminister Review* of 1828, but seems not to know it at first hand. It gives more evidence of advance towards Mill's well-known positions of fifteen years later than appears in Prof. Bain's references to it, and it has always seemed strange to the present writer that it is wholly passed over by Mill himself in the *Autobiography* when he marks the stages in the development of his logical views. If ever a selection of Mill's earlier papers, excluded from the *Dissertations and Discussions*, is made and published, it should especially include this Whately article.

On Truth: A Systematic Inquiry by ST. GEORGE MIVART, Ph.D., M.D., F.R.S. London: Kegan Paul, Trench & Co., 1889. Pp. x., 580.

"This work is a fundamental scientific inquiry, written in plain language, concerning the grounds of all assent, and the relations which subsist between the world and the human mind. It also contains a review of conceptions deemed by the author probable or evidently true respecting the essential natures of the various existences revealed to us by the senses and the intellect. It is an inquiry which necessarily touches upon many popular and scientific beliefs, and it lays down a foundation, based

upon natural science alone, for the systematic regulation of conduct." Its five sections are entitled—Fundamental Facts and Principles, Idealism, Man, The World, Science. Critical Notice will follow.

The Philosophy of Mysticism. By CARL DU PREL, Dr. Phil. Translated from the German by C. C. MASSEY. 2 vols. London: George Redway, 1889. Pp. xxviii., 332, 316.

This is a carefully executed and well annotated translation of a remarkable attempt to give "mysticism" an experimental basis. The facts to which the author appeals are those of dream and of "somnambulism"—under which term is included "artificial somnambulism," or hypnotism. Of two classes of these facts he gives especially full accounts—which have an interest independent of the theories founded on them—in vol. i., ch. 5 ("Dream a Physician," pp. 191-332), and vol. ii., ch. 1 ("The Faculty of Memory," pp. 1-115). He has collected here —(1) cases of direct knowledge by "somnambulists" of the processes of organic life in themselves or others, and examples of their power over these processes, either direct by "natural sanative" action or indirect by the prescription of appropriate remedies revealed in dream; (2) cases of exalted memory in dream and allied states, and of "alternating consciousness". The conclusion he draws from the reports accumulated is that in somnambulism and deep sleep the "threshold of sensibility" is displaced; those vegetative processes, for example, that are "unconscious" in waking life becoming conscious in the state of dream. The dreams of "deepened or exalted sleep" have not the irrational and incoherent character of ordinary dreams. "All the irrational part" of dreams "derives from the participation of the organ which is active in waking life, while all the rational is due to the freedom of the dream-organ from disturbance". Observation of somnambulists shows that there is present to them in dream the memory of their waking life, although, as a rule, they do not remember their dream-life on waking. The dream-life, then, is "higher" than the waking life, since it goes beyond it and includes it. And this is so not merely in the case of somnambulists, but generally. Somnambulists only differ from other persons in manifesting with exceptional evidence what exists in all cases. The heightened memory in dream, for example, is a fact that all may verify who ever chance to remember their "deep" dreams. The explanation of the facts, according to the author, can only be found in a doctrine of dual personality. Man is to be regarded as a single "subject" including two different "persons," the higher person of exalted sleep and of the mystical states generally, and the lower person of waking life. The limited circle of consciousness of the person of waking life is divided by the "psycho-physical threshold" from the life that we call "unconscious" but that is unconscious neither for the "person" of dream nor at any time for the real "subject". Organic processes for "the transcendental Ego lying beneath the psycho-physical threshold" are all in the full light of consciousness. In the "mystical" modes of consciousness—all of which are in essence "somnambulic"—there are to be seen "germinal indications and psychical beginnings" prophetic of new powers that man will acquire in the course of biological evolution. That there are such indications we are led to expect by "Darwinism". The new powers, however, are powers that the same individual will have the use of in the future, not simply, as in the ordinary "Darwinian" view, powers to be acquired for the benefit of "the race". The present life has been taken on by "the transcendental Ego" in order to acquire experience that is preserved in memory for

some future mode of personal existence. The author leaves it somewhat doubtful what are the physiological relations of "the transcendental Ego". On the one hand, he identifies "the transcendental Subject" with "the organising principle in us," and many of the facts suggest to him that, "as waking consciousness proceeds parallel with corresponding changes of the senses and brain, so the transcendental-psychological functions seem to be parallel with corresponding changes in the ganglionic system". On the other hand, he places the same subject at the ground of those "mystical" states in which the life of the senses is suppressed; and, as the translator points out, his general theory requires that the subject should be only partially "immersed" in the physical organism. He has evidently not fully decided in his own mind whether any well-authenticated facts necessitate the assumption of a consciousness without physiological correlate, or whether this assumption is absolutely required by his theory. If he is arguing, as he claims to be, on the ground of a "monistic doctrine of the soul," then there is need of more proof than he gives that the most characteristic cases of "ecstasy" on the one hand, and of the "natural sanative power" of the organism in the hypnotic state on the other, can have precisely the same physiological explanation. Another point on which the translator makes some acute remarks is the author's attempt to find Kantian support for his mysticism. To an argument from the Kantian point of view, the translator—who occupies generally the position of a disciple—objects that the distinction between two worlds of subjective experience, even though one of them be called "mystical," cannot be identified with Kant's distinction between the phenomenon and the thing-in-itself. While only seeking confirmation and not proof of his doctrine in the Kantian philosophy, the author lays some stress on coincidences of parts of his own system with Kant's "intuitive" anticipations of "modern mysticism," and has edited the psychological section of the little-known *Vorlesungen über Metaphysik* (see below, p. 300) with a view to the support of his positions.

Social Progress. An Essay by DANIEL GREENLEAF THOMPSON, Author of *A System of Psychology, The Problem of Evil, The Religious Sentiments of the Human Mind, &c.* London: Longmans, Green & Co., 1889. Pp. xix., 161.

The author continues the series of his works noticed in MIND (for the last, see vol. xiii. 285) by an essay on "Social Progress". The result of the essay is very well given in the following passage: "Social Progress is only made in the direction of obtaining the most perfect liberty. The most complete individual happiness is the ultimate desideratum; but this can in no way be secured but through the perfection of Social Liberty. The latter is even necessary for the perfection of individual freedom. To realise such ideals of liberty there must be law, because only through law can there be security. Nor can security be perfect except there be equality of rights. These, in turn, cannot be maintained if there be great inequality of power. And, in fine, none of these conditions can be completely developed save through the universal prevalence in humanity of that disposition and character by which one finds his happiness and welfare in the happiness and welfare of his fellow-men." In his preface Mr. Thompson gives an interesting account of the development of his thought and of the "plan of life" which he long since formed, and which he has been able to combine with a legal career. It will not be without interest to students generally, he rightly thinks, "to note that it is possible for a man who during all the

period has been also devoted to the study and practice of an exacting profession to carry out for twenty years a systematic plan of philosophical study, writing and publication".

The First Principles of Knowledge. By JOHN RICKABY, S.J. ("Manuals of Catholic Philosophy.") London: Longmans, Green & Co., 1888. Pp. xii., 412.

Another volume of the "Manuals of Catholic Philosophy" follows the ethical volume mentioned in the last number of MIND. The author, after a reference to Mill and Prof. Bain on the necessity of a "material logic," proceeds to the following explanation of the purpose of the present manual: "Little as the modern representatives of the Schoolmen are satisfied, either with the spirit of Mr. Mill's demand, or with the mode of his own response to it, they have deemed it well worth while, not indeed to change the old Logic, but to add to it a new book. . . . The newly-added part of Logic, often called Material, Applied or Critical, takes for its special purpose to defend the objective reality of thought. It is thus an assertion of a form of realism, as against idealism, and is called in this book the "Philosophy of Certitude". For the whole question comes to this: What reasonable account can be given of man's claim to have real certainty about things? What are the ultimate grounds for holding that man may regard his knowledge about objects as undoubtedly correct? Scientifically to draw out the account here demanded is a work appositely described by the title, *The First Principles of Knowledge.*" In Part i. ("The Nature of Certitude in general," pp. 1-247), the Scholastic definition of "truth of intellect" as "the conformity of thought to thing" is defended against the modern doctrines opposed to it. Part ii. ("Special Treatment of Certitude," pp. 249-396) discusses successively the questions of "The Trustworthiness of the Senses," "Objectivity of Ideas, whether singular or universal," "Exaggerated Realism, Nominalism and Conceptualism," "Consciousness," "Memory," "Belief in Human Testimony," "Belief in Divine Testimony". Having in the body of the work contrasted the illogical character and want of system of modern philosophies with the logical and systematic completeness of Scholasticism, the author in his last chapter balances his assertion of "the prerogatives of reason," which have so far been "put higher than this sceptical age is inclined to allow," by an assertion of the superior claims of "supernatural faith," to the production of which "reason alone is inadequate".

Logic. By RICHARD F. CLARKE, S.J. ("Manuals of Catholic Philosophy.") London: Longmans, Green & Co., 1889. Pp. xix., 497.

Deductive Logic. By ST. GEORGE STOCK, M.A., Pembroke College, Oxford. London: Longmans, Green & Co., 1888. Pp. xi., 356.

These two students' manuals—of interest from their different points of view—are reserved for comparative Critical Notice; as in the present No. (p. 271, above) Father Rickaby's *Moral Philosophy* has been set beside the American manual of President E. G. Robinson. Father Clarke is editor of the whole "Stonyhurst Series" of Catholic manuals, which is to include a *Natural Theology*, a *Psychology* and a *General Metaphysics*, beyond the three volumes already published. Father Rickaby's *First Principles of Knowledge* (see previous note) will not be overlooked in connexion with his colleague's *Logic*.

Darwinism and Politics. By DAVID G. RITCHIE, M.A., Fellow and Tutor of Jesus College, Oxford. London: Swan Sonnenschein & Co., 1889. Pp. 101.

"There can be no doubt," the author says, "that the formulæ of Evolution do supply an apparent justification to the defenders of unrestricted *laissez faire* and to the champions, more or less consistent and thorough-going, of existing inequalities of race, class and sex, and a plausible weapon of attack against those who look to something better than slavery or competition as the basis of human society." He accordingly criticises the formulæ in question—namely, "heredity" and "the survival of the fittest"—with a view to showing that, properly understood, they do not condemn the pursuit of a social ideal differing from that of "the aristocratic Conservative" or of "the *laissez faire* Radical". His contentions, reduced to their simplest form, are (1) that the struggle for existence is not simply a physical struggle, but, in human society, is also a struggle among ideas; (2) that for the human race the influence of social institutions and of education must be taken account of over and above the influence of physical heredity. This last especially is of course an important truth to insist on against anyone who should maintain that the formulæ of "survival of the fittest" and "heredity" are, either separately or together, perfectly adequate to the explanation and regulation of all social activities; but it must be said that Mr. Ritchie's applications of it to the criticism of scientific ideas are not always successful. A good deal of the argument on the subject of heredity for example (pp. 51-69) seems to be irrelevant whatever conclusion we are expected to draw. Having first tried to minimise the importance of heredity by citing the opinions of naturalists who disbelieve in the transmission of *acquired* characters, the author quotes from Mr. Galton a passage to the effect that "there is a definite limit to the muscular [and intellectual] power of every man, which he cannot by any education or exertion overpass" (pp. 61-2), and goes on to say, "If this is the *dictum* of science, it might seem for a moment to deal a fatal blow to the aspirations of democracy". He then proceeds to argue that under existing social conditions there are obstacles not recognised by Mr. Galton to the free unfolding of innate powers. Now if this argument is directed against Mr. Galton's position as to the inequality of inherited aptitudes, it in no way touches it. If on the other hand it is only directed against the "too contented acquiescence in existing social arrangements" to which "Mr. Galton *seems* to lend countenance," what is the point of the previous argument that "the doctrine of heredity" may be nothing more than "the survival of a very ancient superstition"? (p. 51). The force of Mr. Ritchie's criticisms is in some places difficult to see because of the uncertainty in which he leaves us as to the precise nature of his social ideal. There seems, for example, a notable inconsistency between pages 85-7 and 88-9. First it is implied that in politics, but not in the family, "the patriarchal stage of social evolution" is already transcended. Then, at p. 89, it is said—"The family ideal of the State may be difficult of attainment, but, as an ideal, it is better than the policeman theory. It would mean the moralisation of politics."

The Elements of Mental and Moral Science as applied to Teaching. By W. C. COUPLAND, M.A., D.Sc., Author of *The Spirit of Goethe's Faust*, Translator of Hartmann's *Philosophie des Unbewussten*. London: Joseph Hughes, 1889. Pp. 103.

"The design of this booklet," the author says, "is to familiarise teachers with the idea of the close relationship subsisting between

Science of Mind in general and Science of Education in particular. In so brief a treatment there is no pretence, of course, of surveying the entire field; in fact, I have merely written a short essay, calling attention, in my own way, to certain aspects of the subject, in the hope of leading some with elevated conceptions of the scholastic profession to engage in a thorough study of the Science and Philosophy of Education." Points to be noted in the author's treatment are his division of minds into the "subjective," "sensuous" and "objective" types (p. 33), and, on the practical side, his views that "the last stage of the educational process consists in the calling into play one supreme motive, *pleasure in the exercise of original power*," and that "it is by the discipline of the natural consequences of action that the true conscience is formed".

Corona: The Bright Side of the Universe. Studies in Optimism. By F. T. Mott, F.R.G.S. London: Williams & Norgate; Leicester: J. and T. Spencer, 1888. Pp. vii., 190.

A rhapsodical development, partly in prose and partly in verse, of a theory called "the force-wave theory," which, "without denying the reality of matter, makes the existence of mind independent of it and superior to it, and opens up a scientific possibility of a future life".

Proceedings of the Society for Psychical Research. Part xiii. London: Trübner & Co., 1888. Pp. 271-397.

Besides an address from the president, Prof. H. Sidgwick, and two other short papers—"Connexion of Hypnotism with the Subjective Phenomena of Spiritualism" (anonymous), "Experiments in Thought-transference," by M. Dessoir—this Part contains a very careful and candid examination by Mrs. H. Sidgwick (pp. 288-354) of the "Evidence for Premonitions" which the Society has so far obtained. Her conclusion is that, though she thinks "no one will deny that some at least of the dreams are, as reported, if not premonitory, at least very remarkable coincidences,"—yet, all things considered, she does not think "the possibility of supernormal prevision should be accepted even as 'a working hypothesis' by the scientific world," as she herself considers "telepathy ought to be accepted". In a "Supplement," which will henceforth consist of "papers not strictly included within the transactions of the Society," Mr. F. W. H. Myers gives a reasoned account of what he calls "Experiments on Strata of Personality" by Profs. Pierre Janet and J. Liégeois, also a brilliant and incisive estimate of "The Work of Edmund Gurney in Experimental Psychology". The writer of the obituary notice of the lamented Gurney in Mind No. 52 seizes this occasion to say that, soon after writing, he became satisfied that it was a mistake to suppose that Gurney's strength had been broken down by the ardour of his Psychical Research work.

A Brief History of Greek Philosophy. By B. C. Burt, M.A., formerly Fellow, and Fellow by Courtesy, in the Johns Hopkins University. Boston: Ginn & Co., 1889. Pp. xiv., 296.

"Most of the works treating of the subject of which this volume treats are learned and extensive, overwhelming the general reader, and even the student, almost, with a sense of the superabundant wealth of the ancient thought in particular, and the world's thought in general. It is hoped that the present work will render accessible in convenient form and quantities some of the noblest portions of the intellectual wealth of Greece. An attempt is here made not merely to expound and elucidate,

but also to present in their historical connexion, and give a just estimate of the validity of, the leading standpoints and categories of Greek thinking. Much reading and not a little original study have been given to the task." The history seems to be careful and accurate; but the author's references, both in the bibliographical list given at the beginning "For the convenience of the student," and throughout, are exclusively to English books and translations.

L'Écriture et le Caractère. Par J. CRÉPIEUX-JAMIN. Précédé d'une Préface de M. le Dr. PAUL HELOT. Avec 146 figures dans le texte. Paris: F. Alcan, 1888. Pp. 313.

The principle of M. Crépieux-Jamin's work is "the identification of handwriting with mimetics". Handwriting is to be regarded as "composed of a number of little gestures". Since the gestures of writing, like those of expression generally, are physiological movements, proportioned, as regards extent, constancy and energy, to corresponding "psychological movements," they may become the ground for inferences to character. "Prenons pour exemple l'écriture rapide. Il nous répugne de penser qu'une série de traits rapides puissent être formés habituellement par un esprit mou, une nature flegmatique. Nos mouvements sont des réponses à l'excitation cérébrale; s'ils sont forts, c'est que le moteur a de la puissance; s'ils sont vifs, c'est que le moteur est animé d'un mouvement rapide. Une écriture rapide répond à une vive excitation nerveuse, elle doit être rapportée à un état psychologique comportant cette excitation: conception rapide, vivacité ou précipitation accidentelle." "Graphology," the author claims, is thus "based on physiology, demonstrated by the experimental method". His results are curious and interesting, whether all of them can be held to be established by strict scientific method or not. The subject is treated under the principal heads of "general" and "special" signs (formation of particular letters, &c.), and of resultants (inference of character from combinations of "signs"). Some pages are devoted to handwriting in disease (pp. 252-300) and to "the origins of graphology" (pp. 17-44), among the precursors of which Leibniz is rightly referred to. (The want of clearness the author complains of in the passage cited from *Leibniziana* at p. 24, it may be remarked, is due to a mistranslation.)

Etudes de Science réelle. Par J. PUTSAGE. L'Instinct et l'Intelligence. De la Responsabilité. Discussion philosophique. Mons: H. Manceaux; Paris: F. Alcan; Bruxelles: A. Manceaux, 1888. Pp. 360.

Belief in anthropomorphic deities, on which social order rested in the past, having lost its power, and modern materialism being incompatible with the ideas of justice and responsibility, the only means of averting the anarchy that threatens modern society (based, as it is, on force and not on right) is a philosophical doctrine equally opposed to materialism and to "deism". The chief positions of this doctrine, as set forth by the author, are the impersonality of the moral order and the eternity of the soul. Human intelligence is the result of the union of the organism with an "immaterial individuality". From the "real sensibility" of man is to be distinguished animal "instinct," which is purely "a result of the organism". Responsibility implies freedom of the will. Man's free-will consists in his capability of choosing between "purely physiological impulses" and "obligations of the moral order"; and this depends on his possession of a principle of "real sensibility," immaterial, uncreated and indestructible. "It may with certainty be affirmed that

future society will be established neither on the basis of materialism nor on that of an anthropomorphism of whatever kind: its basis will be *real science*, that which demonstrates scientifically the immateriality of the feeling of existence, the liberty of actions, the incontestability of right and of eternal impersonal justice."

Etudes sur la Raison. Par FÉLIX CELLARIER. Paris: F. Alcan, 1889. Pp. 279.

These "Studies" are preliminary to a more extensive work; the author's final aim being "to constitute the definitive theory of knowledge". "If we have been fortunate in our efforts, we have obtained an immense result, for we possess henceforth, for knowledge, a larger and more unshakable basis than the *minimum quid inconcussum* of Descartes, his famous *Cogito ergo sum*. This basis is the absolute affirmation of absolute being by the *ego;* we do not add: and consequently the existence of that being, for that would be a pure tautology." From the affirmation of absolute being flow certain "rational ideas," divided into—Ideas representing realities (Ideas of (1) being, (2) substance, (3) cause); Ideas representing attributes (Ideas of (1) infinite, (2) unity, identity, immutability, (3) good, true, beautiful); Ideas representing relations (Ideas of (1) time, (2) space). Against Kant the author concludes that "all judgments *a priori* are analytical, and give us knowledge that we draw really from the rational ideas in which, though in an obscure manner, they are contained". The difference of this conclusion from Kant's he explains by the difference of his point of departure. "Kant does not admit that we know the infinite as we know the finite; for our part, on the contrary, we believe that we attain absolute being, as we attain relative being, by a concrete knowledge." To found the knowledge of the absolute on a concrete fact of knowledge presents the difficulty that this fact must imply "an infinite intelligence". "But can an infinite intelligence be found in a finite being?" To this the author replies by a distinction between "essence" and "existence". The essence of finite existences is infinite. Since the infinite is necessarily one, there is only one essence, although there are "many diverse existences". Consequently, there is only one single reason, "absolute, immutable, infinite, since reason is an attribute of the essence, and not of the existence, which does but manifest it".

Essai sur la Méthode en Métaphysique. Par PAUL DUBUC, Ancien élève de l'Ecole normale supérieure, Agrégé de philosophie, Docteur ès-lettres. Paris: F. Alcan, 1887. Pp. 310.

The author divides the problem of metaphysics into the three traditional ones of "cosmology," "rational psychology" and "rational theology," and each of these again into the questions of "existence" and of "essence". He sets himself to show, against those members of the "positive," "psychological" and "critical" schools who deny the possibility of a metaphysics distinct from science, that these problems all necessarily present themselves, that they cannot be perfectly solved by scientific methods, and that, with the aid of a philosophical method on which henceforth agreement ought to be possible, they may all be solved in the sense of "spiritualism". First, against those who (with Comte) admit no philosophy beyond a synthesis of the objective sciences, he shows that science points beyond itself to the question of the existence of real material objects, and that for the solution of this neither the experimental nor the mathematical method will suffice. Next he proceeds to the consideration of "the subjective method" of psycho-

logists. This, he concludes, is sufficient by itself to solve the questions of the existence and essence of the soul. The testimony of consciousness both proves infallibly the existence of a soul that is essentially active, and enables us to assign to it the attributes of causality, substantiality, finality, unity, identity and liberty. The subjective method, however, leaves unsolved the cosmological and theological problems. The theological problem, or the question of the absolute, is to be solved by the "critical" method, which, although hitherto used chiefly for the destruction of metaphysics, can found as well as destroy. For a positive solution of the question of the absolute in accordance with "critical" method, the author finds hints in Mr. Spencer's position maintained against Hamilton. The same method, he proceeds to argue, justifies us in defining the essence of the absolute in terms of personality, though it is to be admitted that the definition can never be adequate. Philosophy is able to decide positively the question of the existence of the world by the consideration that matter is "impenetrable" for spirit; but it has to leave the question of the "essence" of objects to science. Objective science can determine the phenomenal but not the inner nature of matter; and this remains finally inaccessible to all methods. In the end, therefore, metaphysics, "first philosophy" or "the science of being" retains "rational psychology" and "rational theology" wholly for itself, investigating the former by the "subjective" and the latter by a speculative development of the "critical" method, while it leaves cosmology—except so far as the mere existence of the world is concerned —to the experimental and mathematical sciences.

La Morale d'Aristote. Par Mme. JULES FAVRE (*née* VELTEN). Paris: F. Alcan, 1889. Pp. 388.

A selection of translated extracts from Aristotle, with introductory expositions, on the same plan as *La Morale des Stoïciens* and *La Morale de Socrate* (see MIND xiii. 136, 616). The main divisions under which the extracts are arranged are—Part i., "Virtue"; Part ii., "The individual and social Virtues"; Part iii., "The Affections"; Part iv., c. i. "God," c. ii. "The Soul," c. iii. "Education".

La Morale, l'Art et la Religion d'après Guyau. Par ALFRED FOUILLÉE. Avec portrait de Guyau. Paris: Alcan, 1889. Pp. 200.

"The future of morals, of art, of religion,—three of the greatest preoccupations of our time,—such is the object of this volume. Starting from the ideas of a philosopher, too early dead, who excited universal sympathies in England as in France, the author rises to considerations of perfectly general reach. The dominant idea which Guyau developed in a series of important works is the expansion of life as common principle of art, of morals and of religion. According to Guyau,—and this is the generating conception of his whole system,—life, well understood, involves in its very *intensity* a principle of natural *expansion*, of fecundity, of generosity, which morals, art and metaphysics manifest under three diverse forms. In the first part of his book M. Fouillée examines this idea in its application to art, where it appears to him a necessary corrective of the Spencerian theory that makes of art a kind of play. To bring out this, he examines the *Vers d'un Philosophe*, in which Guyau himself applied his æsthetic doctrines to poetry. The second part sets in relief the new elements brought by Guyau to the ethics of evolution, as well as the principal objections he himself made against contemporary English moralists. The third part has reference to the future of religion and of metaphysics, which again, for Guyau,

attach themselves to the very sources of life, because they constitute the adaptation of the individual to the *universal* life, to universal or cosmical society." Critical Notice will follow.

E. Caro, de l'Académie Française. *Philosophie et Philosophes.* Paris: Hachette, 1888. Pp. 423.

Of these collected papers by M. Caro, written at various times within the last twenty years or more, only the first ("Comment les Dogmes finissent et comment ils renaissent," pp. 1-60) treats directly of "Philosophy" apart from "Philosophers". The rest of the book consists of essays on the life and work of Théodore Jouffroy and Frédéric Ozanam; a study of "Mme. Swetchine: son rôle et son influence dans la société française"; and reviews of works by Cousin, Simon, Ravaisson, Gratry, Jourdain, Saisset and Wallon. The essays are representative work of an independent member of the Spiritualist school.

Maurice de la Sizeranne. *Les Aveugles par un Aveugle.* Avec une Préface de M. le Comte d'Haussonville, de l'Académie Française. Paris: Hachette, 1889. Pp. xviii., 176.

This interestingly written little book is by an author who, having lost his sight (nearly twenty years since) at the age of nine, has come to occupy himself specially with the education and technical instruction of the blind, and with the diffusion among the general public of an interest in their lot. The parts into which M. de la Sizeranne's book is divided are—(1) Psychology of the Blind, (2) Valentin Haüy and his Work, (3) Schools of the Blind, (4) The Blind in Society. The psychology is to a greater extent drawn from observation than from introspection; it being the author's aim to impress on his readers that there is no general intellectual and moral psychology of the blind, who differ from one another in as many ways as those who see; but from observation he is able to point out some characteristics depending on the special acuteness acquired by the senses of hearing, touch and smell. With the development of the sense of hearing he would associate the special feeling for music and poetry often found in the blind. He himself—the son of a painter, and brought up in his father's studio—has always retained a specially strong interest in pictorial imagery (pp. 32-3).

Le Sens de la Vie. Par Edouard Rod. Paris: Perrin, 1889. Pp. 313.

This is a very readable philosophical romance, which may perhaps best be described as a study of the ideal sceptic (tinged with pessimism), who arrives at no fixed intellectual belief of any kind, but who lives exactly as other people do. In four Books, entitled "Marriage," "Paternity," "Altruism," "Religion," the experiences of the hero's life, with the emotions and reflections they arouse, are described in imaginary autobiographic form. He has incipient tendencies to various modern enthusiasms, but can give himself up wholly to none of them; finds that by an act of will it would be quite possible to acquire a religious faith, but that he does not after all desire to have one; and as the end of his reflections thinks of constructing a philosophical system to be entitled "Illusionism," with "Dilettantism" for its practical outcome, but concludes that it is better to leave it unwritten; in the meantime finding enduring satisfaction only in the domestic affections, yet never quite content to become absorbed in these.

Sur la Composition des Sensations et la Formation de la Notion d'Espace. Par L. DE LA RIVE. Genève: H. Georg, 1888. Pp. 99.

An attempt at a mathematical theory of the formation of "the notion of space". In the author's view, "a notion of space might result from the exercise of any one of the senses". "The tactile and visual sensations, however, have a dominant importance in the psychological operation in question, because the exercise of those two senses is accompanied by voluntary movements of a precise kind." For the foundation of the mathematico-psychological theory proposed, colour is taken as "a variable and continuous quantity"; "three variables of coloured sensation" are assumed, *viz.*, (1) tone of saturated colour, (2) degree of saturation, (3) intensity; Young's theory of the three elements of "specific colour" is adopted. "Consciousness of voluntary movement" is resolved into three elements (p. 54), and its mathematical theory worked out separately. Having developed mathematical theories of the "composition" of sensations of colour and sensations of "motor-effort," the author goes on to "the notion of spherical space" and to the separate study of "monocular visual space" (pp. 76-89) and of "tactile space" (pp. 89-99). The latter, he finds, "possesses all the elements of extension. Whilst monocular visual space localises the luminous sources along the directions of angular space without assigning to them a distance from the centre, tactile space localises the causes of contact, along the variable directions from a centre, and by the superposition of a second muscular activity, according to variable distances from this centre."

Prof. GIOVANNI CESCA. *La Religione della Filosofia scientifica.* Padova: Drucker e Senigaglia, 1889. Pp. 42.

Scientific philosophy, while excluding every form of theology, does not exclude religion; for religion contains, besides theology, another element, "the moral ideal," which has gone on increasing in importance as theology has declined. The future religion of scientific philosophy will be "the moral religion of humanity".

Le Degenerazioni umane. Di GIUSEPPE SERGI. Milano: Fratelli Dumolard, 1889. Pp. 228.

The author, having in his earlier chapters studied, on scientific lines, the various forms of "human degeneration"—such as insanity, criminality and the various forms of "parasitism"—discusses in his last chapter the means of social "regeneration". These he finds to be chiefly two—education, especially of the character, and repression. "The protection of the weak" is to be carried out by society within certain limits determined by its effect on the community as a whole. There is no objection to hygienic measures, for example, or to provision against accidents. On the other hand, those forms of "sentimental altruism" that augment the numbers of the degenerate are to be avoided, and there should be no question at all as to "the protection of the bad". "It is not the bad that we must protect but the good, that which is sound; the bad we must resolutely eliminate."

M. ANGELO VACCARO. *Genesi e Funzione delle Leggi Penali.* Ricerche Sociologiche. Roma: Fratelli Bocca, 1889. Pp. 238.

The author criticises at great length the doctrines of the new Italian school of Criminologists as to the origin and nature of crime, and attacks their theory of punishment. His own opinion is that the criminals that are anthropologically "degenerate," having been created by the injustice of society, ought to be treated with special tenderness.

Dott. ICILIO VANNI, Professore ordinario nella Facoltà giuridica dell' Università di Perugia. *Prime Linee di un Programma Critico di Sociologia.* Perugia: V. Santucci, 1888. Pp. 142.

Thinking that what Sociology most needs at present is criticism, the author here examines—impartially and with very extensive knowledge of the literature of the subject—its assumptions, its results, and its position in relation to the other sciences. Sociology, he finds, although in a rudimentary or rather tentative stage, still exists as a definite branch of scientific inquiry. No one group of phenomena, however, has been shown to be the determining factor of social movement. Not even Comte's view that assigns predominance to intellectual factors can be accepted, though it has a far higher degree of probability than the doctrine that gives economical organisation the determining influence. Sociology must be distinguished from the practical sciences—ethics, politics, &c. Among the theoretical sciences it is "autonomous and distinct," alike from biology and psychology; the "differential character" of human social life being the special kind of continuity described under the name of "history". On this depends the practical function of sociology. The law of social evolution, once definitely known, will become a guide to action by making clear how and within what limits the ideal of society can be realised.

Der Ursprung der Sittlichkeit. Von HUGO MÜNSTERBERG. Freiburg i. B.: J. C. B. Mohr (Paul Siebeck), 1889. Pp. 120.

The answer which the writer—following Prof. Wundt—gives to the question of "the origin of morality" is that morality is developed out of "customs," which imply commands of society to the individual. The office of the "moral reformer" is to bring out the relative importance of social commands; in other words, to make explicit the relations they already bear to one another implicitly in the consciousness of the society in which he lives. In the struggle for existence those societies are selected for survival whose commands, as developed, are best adapted to the self-preservation of the community. The customs out of which morality arises are at first "morally indifferent". Morality appears when the individual obeys a command of the "collective will" simply because it is a command, and in opposition to personal inclinations that would lead him to disobey it. When inclinations become perfectly adapted to ethical commands, morality, as a separate thing, disappears. Kant therefore rightly held that only actions done from the mere sense of duty have ethical value. But if an action done from inclination is "morally indifferent" (in this resembling the customs out of which morality arose), it is not therefore less praiseworthy than a "moral" action. For morality has its value—not, as Kant held, in itself, but—as a means to "perfection," that is, to the attainment of an ideal of civilisation towards which humanity is actually moving but which it will never reach; and it is only one means to this end. Its function is chiefly negative, being to suppress actions that prevent man from attaining perfection. Accordingly, "the immoral is in every case worse than the morally indifferent, but the moral is by no means always better than the morally indifferent". Positively—that is, for progress—good actions done out of inclination are of more value than good actions done simply out of regard for the moral law; and in the course of development, both "ontogenetic" and "phylogenetic," strictly moral actions are constantly passing into the class of morally indifferent actions, to the advantage of the race in its progress towards a fuller civilisation.

Logik. Von Dr. CHRISTOPH SIGWART, o. ö. Professor der Philosophie an der Universität Tübingen. Erster Band. Die Lehre vom Urtheil, vom Begriff und vom Schluss. Zweite durchgesehene und erweiterte Auflage. Freiburg i. B.: J. C. B. Mohr (Paul Siebeck), 1889. Pp. xi., 485.

This second edition of vol. i. of Prof. Sigwart's *Logik* (vol. ii. of which was reviewed, on the appearance of the first edition, by Mr. Venn in MIND iv. 426) is extended from the first by 65 pp. The author has sought to profit by the criticisms that have appeared in the fifteen years since the publication of the first edition (1873), and by the new work that has been done in the theory of logic, but, as before, has aimed at reducing references as much as possible and at the avoidance of controversy on points of detail. (In order that vol. ii., with its index, may be used along with the present volume till a new edition of that appears, the original pagination is given with that of the present edition.)

Aus der Innenwelt. Psychologische Studien von Dr. Phil. SUSANNA RUBINSTEIN. Leipzig: A. Edelmann, 1888. Pp. 211.

A former series of Essays by the authoress was noticed in MIND ix. 614. The present "Psychological Studies" are remarkable for the same combination of sound psychological knowledge with delicacy of original observation. The first two—on "Character" and "Feeling" (Gemüth)—treat of the volitional and emotional types of mind; the first being regarded as distinctively masculine, the second as distinctively feminine. The rest treat of—"Sympathy" (in its forms of "Mitleid" and "Mitfreude"), "Æsthetic Feeling," "Sleep and the nocturnal life of the Soul" (including hallucinations, hypnotic and other, as well as the phenomena of normal sleep), "Sensations in general," "Compulsory Colour-sensations" (Fechner's "Zwangsmässige Farbenempfindungen").

Geschichte der Ethik in der neueren Philosophie. Von FRIEDRICH JODL, o. ö. Professor der Philosophie an der deutschen Universität zu Prag. Band ii. Kant und die Ethik im 19. Jahrhundert. Stuttgart: J. G. Cotta, 1889. Pp. xiii., 608.

The author here continues his history of modern ethics, of which the first volume, bringing the history down to the end of the 18th century, was reviewed in MIND viii. 295. In this second volume he deals with ethical philosophy in Germany (bk. i., pp. 3-290), France (bk. ii., pp. 292-394), and England (bk. iii., pp. 397-494) during the present century, beginning in the case of Germany with a chapter on Kant. The notes and references, which, as before, are brought to the end of the volume, extend over pp. 495-698. Critical Notice will follow.

Lose Blätter aus Kants Nachlass. Mitgetheilt von RUDOLF REICKE. Erstes Heft. Königsberg: F. Beyer, 1889. Pp. 302.

This first set of *Loose Leaves from Kant's Remains* has already appeared in the *Altpreussische Monatsschrift* (1887-88). Their *provenance* is from two sources: that of the smaller number (pp. 1-59) from a purchase made by the Königsberg library at a bazaar at Dantzic in 1878, that of the far larger amount from various collections (long before acquired by the same library), which about 1838 were more or less arranged by Schubert (joint editor of Kant's works) in thirteen bundles, with titles describing their contents. Omitting some letters, to be otherwise made public, the editor of these fragments, Dr. Reicke, now gives, carefully edited, from the Dantzic group, Kant's notes on topics such as reality,

happiness, analytical and synthetical propositions, and other points familiar to the readers of the two *Kritiken* (Pure and Practical Reason). The papers from the more extensive collection (of which this present instalment gives only four out of the total thirteen bundles, *viz.*, those numbered A to D) cover nearly the whole of Kant's literary career. Those of A are mainly mathematical in content: they comprise some papers from the years 1755-63, as well as some from the period 1789-93. The three other bundles (of which D is the bulkiest) are chiefly in reference to the critical period 1783-96, though a few belong to an earlier date. Several of those from C belong to the preliminary sketches for published essays, *e.g.*, the polemic against Eberhard and Schiller. The general drift of the contents of bundle D appears from the recurring heading, "Wider den Idealism": they refer to the change of front, if not of doctrine, which Kant made between the first and second editions of his great work. There are also fragments of an essay on optimism, probably as early as 1754. Besides the biographical interest of these notes, scattered on casual pieces of paper, backs of letters, and the like, they are obviously valuable indications in many cases of the points to which Kant attached special importance.

IMMANUEL KANT'S *Vorlesungen über Psychologie.* Mit einer Einleitung: "Kant's mystische Weltanschauung". Herausgegeben von Dr. CARL DU PREL. Leipzig: Ernst Günthers Verlag, 1889. Pp. lxiv., 96.

Dr. du Prel, as mentioned above, p. 289, edits these lectures on Psychology—which form part of Kant's *Vorlesungen über Metaphysik*, first published in 1821—with a view to confirming the mystical doctrine for which he believes that he has already found an inductive basis. The psychology of the *Vorlesungen*, he seeks to show, puts Kant's *Träume ein s Geistersehers* in a new light, giving this a turn decidedly favourable to mysticism. Kant's general philosophy, besides, leaves a place open for a mystical doctrine. "The thought of Kant that the perceptible world is only the phenomenon of a for us unknown thing-in-itself, that space and time are only forms of our knowledge, is eminently mystical, and so far one can certainly call Kant a mystic." This, it may be said, is to give the term a somewhat extended sense; but Dr. du Prel certainly proves that Kant refused to deny dogmatically the possibility of the classes of phenomena—including ghosts—to which "modern mysticism" appeals. "The earthly life"—thus the editor expresses his own mystical doctrine—"is only the dream of a transcendental subject" (p. xlix.). Rather curiously, in his last two pages he insists on the danger of mixing up the two kinds of experience, the "transcendental" and that of ordinary life. Since the "transcendental subject" has assumed a new personality for the sake of the discipline that is to be gained by temporary forgetfulness of the antenatal life, and by new modes of experience, mixture of antenatal memories with earthly life would frustrate the purpose it had in incarnating itself. The mystical doctrine of the soul, therefore, while it has a high theoretical value and important ethical applications, is not to be allowed to pass into "practical mysticism" (pp. lxiii.-lxiv.).

System der Ethik, mit einem Umriss der Staats-und Gesellschaftslehre. Von FRIEDRICH PAULSEN, a. o. Professor an der Universität Berlin. Berlin: W. Hertz, 1889. Pp. xii., 868 (2 Hälfte).

Dr. Paulsen's name is a guarantee of work at once thorough and readable. This treatise on ethics, with the outlines of a social and political philosophy, though called a system, is only such in the general sense of

a connected and consistent discussion of the main topics of moral inquiry. A short indication of its contents may be given. After an introduction (pp. 1-17) explaining the author's view of the province and methods of ethics (midway between the field of absolute morality and the direction of individual conduct), Book i. (pp. 23-167) presents a summary but highly instructive sketch, first of the dominant ideas of the aim and essence of life, held respectively by the Greeks, the early Christians, and the modern civilised world; and secondly, of the main steps in the development of moral theory taken by the Greek, the medieval, and the modern systems. Book ii., following on this historical survey, discusses (pp. 171-366) questions of principle, the meaning of the cardinal ideas on which ethical argument turns. Such are good and evil, the supreme good or chief end of man, duty and conscience, egoism and altruism, virtue and happiness, and free-will. It includes a special chapter (pp. 218-257) in examination of the arguments for the creed of Pessimism. The governing tendency of this part of the work is its effort to reconcile ideality of aim and tone with a sound realism founded on the critical treatment of experimental data. Book iii. (pp. 369-373), which gives an exposition of the aspects of the moral life, roughly classed under the heads of the individualistic and social virtues (and duties), is full of fine observation and wise suggestion for conduct. Beginning with those fundamental duties to self which, as self-control and reasonableness, constitute the elements of all higher morality, it sets forward what are the things needful to realise the best of life for a being with bodily wants (involving permanent economic means) no less than intellectual; and then deals with the sense of honour, adding a short chapter on the moral aspects of suicide. The social virtues give title to the discussion of benevolence, justice, charity and truthfulness—of which the last is especially full and interesting. Book iv. (pp. 577-861) is devoted to social and political problems. These are considered under the four forms of the common or collective life, *viz.*, the family, social friendship, economical society, and the State. In the third of these divisions (treating of the structure of the social system and its economic bases) there is an ample and fair-minded examination (pp. 698-791) of Socialistic reform-theories and of the Socialist-democratic struggle in Germany. Critical Notice will follow.

Naturforschung und Schule. Eine Zurückweisung der Angriffe Preyers auf das Gymnasium vom Standpunkte der Entwicklungslehre. Von Dr. H. Vaihinger, a. o. Professor der Philosophie an der Universität Halle. Köln u. Leipzig: Albert Ahn, 1889. Pp. xii., 54.

"Superficial occupation with natural science," the author writes at the end of the preface to this reprinted Address (delivered originally before a scientific audience, and now enriched with very copious notes), "may lead to the undervaluing of classical antiquity; but deeper penetration into nature leads back to antiquity." His aim has been to show, by arguments based on the principles of physiological psychology and on the theory of evolution, that humanistic culture such as is given in the classical Gymnasia must remain permanently the basis of higher education. He starts from the biological law of the parallelism of "phylogeny" and "ontogeny". According to the view that regards biology as the foundation of psychology, this law, he proceeds to argue, should be applicable to mind as well as to the physical organism. Its psychological application is evidently this—that the development of the individual mind is a recapitulation of human history. This *a priori* extension of the law of the parallelism of ontogenetic and phylogenetic

development is confirmed empirically by observation of individual minds. The pedagogical inference from it is that the individual can only be raised normally to the level that humanity has now attained if his education is made to follow the stages of the education of the race, that is, the stages of historical development. Now the stages of the history of European civilisation are—(1) the Græco-Roman world, (2) the "Christian Teutonic" middle ages, (3) the modern world. In modern European education, therefore, the classical languages and literature should come first; then modern languages and the part of their literature that has its basis in the mediæval world; while the characteristic product of the modern world, natural science, with its search for exact knowledge of causes, should be introduced last of all. The evolutionary law on which he bases his theory is to be received, according to the author, as in part a confirmation of the doctrine of those pedagogical writers who have held that education should follow the course indicated by nature, and in part as a means of giving—with the aid of the philosophy of history—a greater precision to that doctrine. In his appeal to the authorities, from Aristotle onwards, who have stated in some form the precept that the educator should "follow nature," he finds especially strong support among the scientific authorities. Prof. Huxley and Mr. Spencer, in particular, supply him with sentences which—taken along with his historical view—can be quoted with peculiar effectiveness (pp. 8-9). While contending for the permanence of the classical basis of education, Dr. Vaihinger does not propose to leave the Gymnasium exactly as it is, but suggests several reforms, such as greater attention to physical training and to English literature, the dropping of compulsory writing of Latin essays, and the introduction, in the later stages, of more mathematics and natural science. His arguments all deserve attentive study.

Beiträge zu den Theorieen des Syllogismus und der Induktion. Von Dr. Otto Seiffert. Breslau: Brehmer & Minuth, 1888. Pp. 49.

The author examines the theories of the syllogism and of induction put forth by Mill, Jevons, Sigwart, Erdmann, &c., with a view to arriving at a theory of his own. In his theory of the syllogism he lays stress on its mediating function. This, he contends, rescues it from the charge of being a mere *petitio principii* (pp. 14-16). For "in the syllogism the validity of one, but only of one premiss, is conditioned by the validity of the conclusion" (p. 16). In his theory of induction he seeks to distinguish, from the deductive element that is invariably a constituent of the inductive reasonings of developed thought (p. 38), a purely inductive element, the essential character of which is that every new particular case gives additional probability to the general conclusion (p. 44).

Metaphysik. Eine wissenschaftliche Begründung der Ontologie des positiven Christentums. Von Theodor Weber. Erster Band: Einleitung und Anthropologie. Gotha: F. A. Perthes, 1888. Pp. viii., 427.

The general purpose of the work of which this is the first part is identical with that of the author's criticism of Du Bois-Reymond noticed in Mind xi. 138. The present volume is intended to bring about "a complete reconciliation," so far at least as ontology is concerned, "of knowledge with (religious, old Christian) faith, of reason with revelation, of philosophy with (genuine, true) theology".

Die Welt- und Lebensanschauung Friedrich Ueberwegs in seinen gesammelten philosophisch-kritischen Abhandlungen. Nebst einer biographisch-historischen Einleitung von Dr. Moritz Brasch. Leipzig: Gustav Engel, 1889. Pp. xlvi., 476.

Dr. Brasch has here collected Ueberweg's scattered philosophical writings, and has furnished them with an Introduction (pp. xi.-xlvi.—"Friedrich Ueberweg, his life, his writings and his philosophical importance") in which the various influences under which he came, the general nature of his final conclusions, and his attitude towards the controversies of the time, political, religious and philosophical, are very well described. The collection is full of interest and shows well the many-sidedness of Ueberweg's mind. The papers are brought under the heads of "Logic, Theory of Knowledge and Metaphysics" (pp. 1-260), "Mathematics, Philosophy of Nature and Psychology" (pp. 263-349), and "Ethics" (pp. 353-438); two "Philosophical Addresses" being added in an appendix (pp. 441-476), which treat respectively of the historical place of Jacobi in German philosophy, and of the idea of destiny in Schiller. At the end of the first series is reprinted a "Controversy on the principles of the Berkeleyan Phenomenalism" between Ueberweg on one side and the late Dr. Collyns Simon and two German champions of Berkeley on the other. This extends over pp. 87-260. There are several papers dealing more or less directly with Kant. Ueberweg shared the tendency of his day to return from the later German philosophies to the Kantian criticism of knowledge, but was not content to remain simply a Kantian. The critical philosophy he held to be not a settled result but a "stage of transition" to some new doctrine. The doctrine of "ideal-realism" by which he himself sought to mediate between the mechanical and the idealistic doctrines of later German philosophy shows signs of the influence exercised over him by Aristotle and Leibniz as well as by modern scientific ideas; its most noteworthy point being the view of nature as consisting in a continuous "scale of beings" from mechanical forces up to man. Ueberweg's ethical papers aim at the fusion of Aristotelian with Kantian ethics. The first stage of this fusion he finds in the ethics of Herbart. Kant's "formal" and Aristotle's "material" principle are to be reconciled finally in a doctrine that places the ethical "form" in certain relations to one another of its "matter"—that is, of the "goods" that are ethical ends. The "goods" consist, as Aristotle taught, in certain human activities, and these may be arranged in a scale according to their rank. The formal principle of morality is that the highest of two ends—its accomplishment being supposed possible for the individual—is to be chosen. The morality of the individual, however, does not depend on the rank of the activity chosen, but on the disposition (Gesinnung) in choosing. All activities may be equal in moral rank if the disposition in choosing them is the same. It is this that Kant had in view in his doctrine of the categorical imperative.

Spinoza's Entwicklungsgang, besonders nach seinen Briefen geschildert. Von Dr. phil. A. Baltzer. Kiel: Lipsius & Tischer, 1888. Pp. 169.

The author seeks to trace the development of Spinoza's thought by means of reference to his correspondence and to the circumstances of the time. It is on the point that there *is* a traceable development that he lays stress rather than on any important new conclusions in matters of detail which he believes he has arrived at. By means of the *Letters* he thinks it can be shown that numerous alterations suggested by the criticisms of friends were made in the *Ethics*, the final "redaction" of which probably dates from 1675. Again, in Spinoza's political doctrine he traces an influence of the circumstances and events of the time; the object here being to show that Spinoza was not absolutely a "solitary" thinker, but was in contact with political life. When, however, for this

he supposes that Spinoza may have come into personal contact with Hobbes, he not only has no evidence to produce, but goes straight in the teeth of well-known facts. And his other supposition that Spinoza replies to Leibniz (still at the journeyman stage), in propositions of bk. i. of the *Ethics*, is surely idle enough.

Francis Bacon und seine geschichtliche Stellung. Ein analytischer Versuch von Dr. HANS HEUSSLER, o. Prof. der Philosophie an der Universität Basel. Breslau: W. Koebner, 1889. Pp. 199.

The author, having been led to acquire a very intimate knowledge of Bacon, has arrived at the conclusion that it is an error to represent him as in a special sense the founder of modern empirical philosophy; his view of things being in reality marked by a strongly rationalistic tendency. This he seeks to bring out by comparison with points in the doctrines of "the three great rationalists of the 17th century"—Descartes, Spinoza and Leibniz (pp. 134-7). Points of contact are also found between Bacon and Kant (pp. 138-9). Bacon, the author of course allows, was not exclusively a rationalist; but if stress were to be laid on resemblances with particular thinkers, then, he thinks, modern rationalism might just as easily be traced to Bacon's writings as modern empiricism. What he really did was to announce eloquently the typical modern view of nature, and not the specially rationalistic or empiristic side of this view. The exposition—which touches upon most of the controverted points as to Bacon's life and character, moral and intellectual—is both fluently written and very copiously illustrated with notes and references (pp. 140-199), which show familiarity with the most recent literature.

Karl Philipp Moritz als Aesthetiker. Von Dr. MAX DESSOIR. Berlin: Carl Duncker's Verlag (C. Heymons), 1889. Pp. 57.

K. P. Moritz (1757-1793) has already been made the subject of a biography (by Geiger). His works also have recently been reprinted. The present monograph, which deals with him specially as an æsthetician, presupposes a general knowledge of the facts of his life and a certain familiarity with his principal æsthetic work (*Abhandlung über die bildende Nachahmung des Schönen*, Braunschw. 1788). The author places him in a group with Shaftesbury, Winckelmann and Herder.

Johann Elias Schlegel. Von Dr. EUGEN WOLFF, Privatdocent an der Universität Kiel. Berlin: R. Oppenheim, 1889. Pp. iv., 219.

A biography of J. E. Schlegel (1718-1749), the brother of Adolf and Johann Heinrich Schlegel, giving a full account of his activity as poet and æsthetician. The author regards him as a precursor of Lessing.

RECEIVED also:—

J. Nichol, *Francis Bacon*, pt. ii., Edinburgh, Blackwood, pp. 259.
B. Bosanquet, *Essays and Addresses*, London, Sonnenschein, pp. 199.
F. Lichtenberger, *German Theology in 19th Century*, Edinb., Clark, pp. 629.
Anonymous, *Agnostic Faith*, London, Ridgway, pp. 55.
G. T. W. Patrick, *Heraclitus*, Baltimore, Murray, pp. 131.
W. Cook, *Butler and Kant*, Ann Arbor, Andrews, pp. 52.
E. de Roberty, *L'Inconnaissable*, Paris, Alcan, pp. 192.
J. N. Scherejew, *Selbstsein*, Berlin, Duncker, pp. 144.
L. Weinsberg, *Der Mikrokosmos von J. ibn Zaddik*, Breslau, Koebner, pp. 61.

NOTICE will follow.

VIII.—NOTES.

THE BLIND-DEAF-MUTE HELEN KELLER.

The summary account of this remarkable child's case, given in No. 50 of MIND, from the American journal *Science*, proved, on comparison with the Perkins Institution *Report* for 1887, with a copy of which we were later favoured by the Director Mr. Anagnos, to have been so well drawn up that only a few particulars remained to be added to the psychological chronicle. The child, it may be remembered, lost her sight and hearing by illness at the age of nineteen months. When, after a time, her general health became restored, she had the advantage (over many other sufferers of the same class, though Laura Bridgman, her best-known predecessor, was not ill-off in this respect) of growing up in circumstances not unfavourable to mental development. The hope was not readily abandoned by her well-to-do parents that something might be done to restore the lost senses to a child that showed extraordinary eagerness and ability to make use of the senses that were left her. At last, however, it became clear that, if she were to be regularly educated, it must be done by methods similar to those that had worked such wonders in the case of Laura Bridgman. Being applied to for help, the present able and enthusiastic Director of the Perkins Institution charged one of his female graduates with the task of repeating Dr. Howe's famous experiment. Miss Sullivan, the teacher selected, had herself, only eight years before, been admitted to the Institution at the age of sixteen, suffering from an obscuration of vision which, added to other hardships in earlier years, left her whole education still to be gained. But she proved to be of a character, moral as well as intellectual, that responded admirably to the exertions made on her behalf, and, also recovering in time the use of her eyes by surgical help, she emerged from the training of the Institution fit for any educational work that could be laid upon her. Accordingly, after careful preparation by study of Dr. Howe's methods with Laura Bridgman and otherwise, she repaired to Helen Keller's home in Alabama, and there began the course of education which in a few months led to such astounding results. To the record as given in MIND No. 50, perhaps the only point of importance that needs to be added is that the child first taken (most literally) *in hand* by Miss Sullivan in March, 1887, and able to write her first letter in July, passed between September and October from the use of the third person for herself and others, as in the words 'Helen will write little blind girls a letter, &c.,' to the full pronominal 'Dear little blind girls, I will write you a letter, &c.'. There was also remarkable progress, from July, in grammatical construction generally and in caligraphy, but not such as to leave the first letter other than a marvel in both respects for only four months' instruction. The intelligence that could in that time be so affected—solely and exclusively through hand-contact with the teacher's hand—and that could be rendered thereby so vastly more effective than that of most normally-endowed children, is surely one whose later progress ought to interest every psychologist.

A further *Report*, for 1888, has now come to hand, bringing Helen's story down to October of that year. Here follow what seem the more important points in Miss Sullivan's account:—

During the past year Helen has enjoyed excellent health: she is tall

for her age (8 years), well formed and vigorous. Skilful specialists have examined her and are of opinion that she cannot have the slightest perception of light or sound; the remaining senses have improved. It is impossible to tell exactly how far smell and taste aid her to knowledge of physical qualities, but she certainly derives great pleasure from these senses. Touch has sensibly increased in power, as she is able not only to distinguish with great accuracy the modulations of the air and vibrations of the floor made by sounds and motions, and to recognise friends and acquaintances the instant she touches their hands or clothing, but she also perceives the state of mind of those around her. It is impossible for anyone with whom she is conversing (by contact) to be particularly happy or sad and conceal the fact from her. Whereas, in the previous *Report*, Miss Sullivan had been disposed to credit her with some inexplicable mental faculty, it now appears on closer observation that her power of divining the thoughts of those she is with may be wholly explained by her acute perception of their muscular variations. Recently when her ears were being examined by the aurists at Cincinnati, all present were astonished at her appearing to hear not only a whistle but an ordinary tone of voice: she would turn her head, smile and act as though she had heard what was said. Miss Sullivan was then holding her hands. "Thinking" (says Miss Sullivan) "that in all probability she was receiving impressions from myself, I put her hands upon the table and withdrew to the opposite side of the room. The aurists then tried their experiments with quite different results. Helen remained motionless through them all, not once showing the least sign that she realised what was going on. At my suggestion, one of the gentlemen took her hand, and the acts were repeated. This time her countenance changed whenever she was spoken to, but there was not such a decided lighting-up of the features as when I had held her hand." In this connexion reference is also made to the emotion she showed in first visiting a cemetery in the previous year, though she then had been told nothing about death or the burial of the body. She has now learned that animals when dead are put into the ground, and showed afterwards, on another visit to a graveyard, a surprising grasp of the meaning there of a girl's name which she was made to feel on a marble slab. "She dropped" (says Miss Sullivan) "upon the ground as though looking for something; then turned to me with a face full of trouble and asked, 'Where is poor little Florence?' I evaded the question, but she persisted in asking about her. Turning to my friend, she asked, 'Did you cry loud for poor little Florence?' then she added, 'I think she is very dead. Who put her in big hole?'" And, on returning to the house of this friend, mother of the dead Florence, though of this the child had known nothing, she ran to the closet where were some toys that had been given her the evening before, and carried them to the lady, saying, 'They are poor little Florence's'—which was perfectly true.

Notwithstanding the activity of Helen's mind, she is a very natural child, fond of fun and frolic. She likes much to be with other children, and is never fretful and irritable; playing for hours together with children who cannot understand a single word she spells. A baby invariably calls forth all the motherly instincts of her nature. While delighting to be with people who can follow the rapid motions of her fingers, she will yet amuse herself for hours at a time with her knitting or sewing. She reads a great deal, bending over her book with a look of intense interest, and, as the forefinger of her right hand runs along the line, she spells out the words with the other; but often her motions are so rapid as to be unintelligible even to those accustomed to her

swiftness. Extremely affectionate herself, she does not realise that one can be anything but kindhearted and tender. She is very fond of all the living things at home, and will not have them unkindly treated: for example, not allowing the driver to use the whip, when she is riding in the carriage; and, though at first angry on hearing that the birds and bees were eating all her father's grapes, quickly pleased when told that they were hungry and did not know it was wrong.

She continues to make rapid progress in language, having now a vocabulary of about 3000 (!) words, all of which she spells correctly and uses with astonishing freedom. She seems always to think in words; and in sleep her fingers go on spelling the confused and rambling dream-thoughts. She soon discovered, in manual converse with the many people she has come into contact with (at Boston and elsewhere) during the year, that "the words she began to learn a year and a half ago were capable of expressing, not only her physical needs, but also her mental sensations and emotions, and of describing her many and varied experiences, as well as conveying her wishes and thoughts, her dreams and fancies, her hopes and fears". In travelling, her thirst to be told what her teacher sees by the way is insatiable, and thus she learns countless new expressions without any apparent effort. At first, in speaking, she was apt to use only the important words of a sentence, as 'Helen, milk,' but easily was helped over this tendency, and quickly learned that the same idea could be expressed in a variety of ways. Miss Sullivan believes it was more through association and repetition than through any explanation (from which she was in the first instance obviously precluded) that she has attained her remarkable power, for a child, of intelligently using names of abstract or subjective import. "One day" (says Miss S.) "I asked her a very simple question in the combination of numbers, to which I was sure she could give a correct reply. But she began, as children often do, to answer at random. I checked her, and she stood still, the expression of her face plainly showing that she was trying to think. I touched her forehead, and then spelled t-h-i-n-k. It was the first time I had given her the word; but, being thus connected with the act, it seemed to impress itself on her mind much as if I had placed her hand on an object and then spelled its name. Since that time she is always using the word 'think' intelligently." She has not been taught language on any system, but in dependence on the suggestions afforded by the spontaneous movements of her own mind. And here may be noted the facts which also Mr. Anagnos (who has seen the child at her home as well as in Boston, and who is one of her chief correspondents) tells of her extraordinary linguistic aptitude. French and German, Latin and Greek words and phrases have, upon occasions that a common child would pass by, been extracted by her from him and Miss Sullivan, and the "little witch," as he calls her, is found retaining them months afterwards and using them with the utmost propriety and exactness in the midst of her excellent English writing.

In point of general intellectual growth, it is reported that, while regular instruction has been stopped in order to avoid unduly exciting her over-active brain, she continues as eager to learn as at first and in every direction that opens up. She has been encouraged to put her thoughts on paper and keep a diary, in which the impressions crowding in upon her get record of this kind:—'Teacher and I went to ride in a boat. . . . Boat did glide swiftly, and I put hand in water and felt it flowing. . . . When we look around us we see land and the water. The land is firm and solid. We walk and ride over it we build our

houses upon it we sow seeds in it and soon it is covered with young plants. . . . The water is not solid and it is not firm we cannot walk or ride in carriages over it and we do not build houses upon it. But we can build ships and boats to carry people upon the water. The earth is round like a very large ball. It is always whirling round. It never stops for a minute. . . . To-day I learned many new words. . . . *Family* is father and mother and brothers and sisters. *Daughter* does mean girl child, *son* does mean boy child. *Observe* means to look at everything very carefully. I observed teacher's hair was coiled this morning.' Take also this from Miss Sullivan:—On a visit to a circus with wild animals, "I tried to describe to her the appearance of a camel, but as we were not allowed to touch the animal I feared that she did not get a correct idea of its shape. A few days afterwards, however, I became satisfied that she had made a very good mental picture of it; for, hearing a commotion in the schoolroom, I went in and found Helen on all fours with a pillow so strapped upon her back as to leave a hollow in the middle, thus making a hump on either side. Between these humps she had placed her doll, to which she was giving a ride round the room. I watched her for some time as she moved about, trying to take long strides in order to carry out the idea I had given her of the camel's gait. When I asked her what she was doing, she replied, 'I am a very funny camel'." Instances of her abounding interest in everything and everybody she came across in travelling are given at considerable length, but must be passed over; also curious specimens of her reproduction of stories she has read. Room, however, must be found for the following (from Mr. Anagnos):—"One day a number of persons were shown by Miss Moulton, the matron of the Institution, a crystal lemon-squeezer of new design, and all tried in vain to guess what it was. It had never been used, and its shape failed to suggest to anyone its purpose until Helen examined it. She immediately spelled 'lemonade,' and wished for a tumbler in which to prepare some. When the glass was brought she put the squeezer in proper position upon it. On being closely questioned as to what had suggested to her an idea which the adults around her had failed to catch, she twice put her hand to her forehead, and spelled 'I think'." Where there is an intelligence like that, one can believe that before her regular lessons were stopped in last March, she made considerable progress in arithmetic; learning the multiplication-table and doing sums in her head. She learned also to represent numbers on the type-slate used by the blind; and, though at first it was difficult for her to understand that the types represented so many apples and oranges, she after a few days overcame this obstacle, and was incessantly puzzling her brain with examples; even in bed her thoughts still dwelling upon numbers till she became so excited that she could not sleep.

At Boston, where a kindergarten has now been founded (to the great advantage of blind children) in connexion with the Perkins Institution, Helen, after a few lessons, could model in clay very well, and also learned bead-work very quickly. It is mentioned, however, that, though, like other children, she examines every object within her reach to ascertain its size, shape, density and use, her judgment of distances and of the relation of places to each other is less accurate than that of blind persons in general; she often has been seen to make the circuit of a room several times in searching for some article she had just laid on a chair or table. In this and also in other respects there is a remarkable difference between her and another blind-deaf-mute little girl, who is now under training at the Perkins Institution. This child, Edith M. Thomas, a year older than Helen Keller, had her senses till

the age of four, and this fact *may* help to account for what is reported of her—that she is remarkably quick and fearless in her movements both out of doors and in the house, having soon learned her way about the building, and now going alone, with the greatest freedom, in search of whatever she wishes for. Her perception of the situation and the relation of objects around her is very accurate, and so is her judgment of distances. A month after being in the kindergarten, "on returning from a walk of about a mile, she put out her hand to find the gate when only two or three rods away from it". With this, in her case, there goes also much finger-skill; but, whereas Helen Keller from the first moment of her verbal education (see MIND xiii. 316) was eager to pass from object to symbol, and in little more than a week understood that all things could be expressed by (manual) signs, Edith could not easily be brought to interest herself in the manual alphabet, and took two weeks before she would make any letters with her own fingers. The restraint of regular occupation, even for half-an-hour, she violently resisted; and thus may be understood how after ten weeks she had learnt but 43 words, and at the end of a year (or, more properly, nine months' actual instruction) not more than 400,—though, all things considered, even this achievement is remarkable enough. With inferior verbal aptitude, which shows itself also in her handwriting (but not in any defect of spelling, so far as her vocabulary extends, since "she must spell a word every time she uses it"), Edith shows no common force of character, and in particular shows, in connexion with the mischievous or other unsocial impulses natural to a child of exceptional vigour, a quite pathetic determination to struggle with and conquer them. When some temptation has come in her way, she has unawares been seen straining every effort to overcome it—"striking herself violently and repeatedly, sometimes throwing herself on the floor, kicking and pounding"—and always successfully in the end "if left entirely to herself".

Enough has now been said (mostly quoted) to show what a fund of psychological interest is again, since Dr. Howe's death, to be looked for in the Perkins Institution *Reports*. The future history of these two children, so different in their natures but now subjected to a systematic training the same in principle, cannot be too closely watched.

EDITOR.

ON THE PHILOSOPHIC TERM, PHENOMENON.

Every Greek scholar knows that the verb φαίνεσθαι has different meanings with an infinitive and with a participle, signifying, for example, with εἶναι, 'to appear to be,' with ὄν, 'to evidently be'. This double construction gives a twofold meaning to τὸ φαινόμενον, which signifies either 'what appears' or 'what evidently is'. Hence, Aristotle uses the term in a variety of ways: for the apparent as distinguished from the real good (*Eth. Nic.*, iii. 4), for appearances in our eyes as opposed to the perfect sphericity of the world (*De Cœlo*, ii. 4), for all appearances to sense (*ib.*, iii. 4), for facts in contrast to their causes (*De Part. Animal.*, i. 1). Once he even seems to call the intelligence of God the most divine of phenomena (*Metaph.*, lib. 9). In short, τὸ φαινόμενον, sometimes opposed as it is to a thing and sometimes signifying a thing which evidently exists, oscillates between subjective appearance and objective fact. This ambiguity has produced an equivocation in the modern term, phenomenon. Sometimes a phenomenon means an appearance in our senses, usually supposed to be produced by a thing: in this meaning, only sensible objects are phenomena. Sometimes a phenomenon means

anything whatever as a fact opposed to its causes; in this meaning, phenomena include all facts, sensible and insensible. The former is the use of Kant, who expressly identifies phenomena with *Sinnenwesen* (*K. d. r. V.* "Von dem Grunde der Unterscheidung . . . in Phaenomena u. Noumena"); whereas Newton used the term in the latter and wider way. Book iii. of the *Principia* cites as phenomena the movements of planets round the sun, in the sesquiplicate proportion of their mean distances from the sun, and describing, by radii drawn to the sun, areas proportional to the times. Such measured movements of planets are quite imperceptible, and are called phenomena, not as being sensible, but as facts in contrast to gravitation, which is their cause. By phenomena, then, Kant means sensible appearances; Newton, all facts, sensible and insensible.

The former meaning has established itself in mental, the latter in natural philosophy. But it makes all the difference which we mean. Mental philosophers, after starting with the narrow use of Kant, take advantage of the comprehensive use of Newton to decide that all objects of knowledge are phenomena. In the Newtonian use this identification is true; in the Kantian it is false. Everything known is an evident fact. But, as very few of such facts in the sciences are patent to the senses, it neither follows, nor is true, that everything known is a sensible appearance. Yet it is to be feared that much of modern philosophy is founded on a transparent fallacy of equivocation, in which the major premiss takes phenomenon as sensible appearance, while the minor uses the same term for any fact, sensible or insensible, as follows:

All *phenomena* are sensible appearances;
All objects of knowledge are *phenomena;*
∴ All objects of knowledge are sensible appearances.

THOMAS CASE.

A NEW ANTHROPOLOGICAL METHOD.

Dr. E. B. Tylor has just published, in the February No. of the *Journal of the Anthropological Institute*, under the title "On a New Method of Investigating the Development of Institutions; Applied to Laws of Marriage and Descent," a paper of exceptional interest and importance. The results at which the author arrives in the particular field investigated would by themselves be sufficient to make the paper a remarkable one. It is not, however, on the results, interesting as they are, but on the new method by which they are attained, that Dr. Tylor insists both in opening and in concluding; and it is this method that an attempt will be made here briefly to describe.

The distinction of the method is that by it causal relations among social facts are discovered which may be regarded as scientifically certain previous to any psychological deduction. Thus speculative explanation, when it begins, is "at once guided in its course and strictly limited in its range by well-marked lines of fact to which it must conform". Scientific certainty merely from comparison of the facts is attained by their strict numerical treatment on a basis of tabulation and classification—a basis which the author has spent many years in providing. Suppose a provisional classification of the customs of between three and four hundred peoples to have been made, and the mutual "adhesions," or relations of coexistence, of these customs to have been tabulated, then, starting with any two customs, we have to find (1) the number of their "adhesions," (2) the number of times they would coexist

according to the ordinary law of chance-distribution. The first number is ascertained from the tables, the second calculated from the total number of peoples classified and the number of occurrences of each custom. If the actual number of "adhesions" is much greater than the number of chance-coincidences obtained by calculation, then we may infer at once that there is some causal connexion between the two customs. A provisional explanation of the connexion may be hazarded in accordance with the assumption that human nature in all stages of social development has certain general psychological resemblances. This will indicate inquiries as to causal connexions with other customs. When new causal connexions have been ascertained, the first explanation may, if necessary, be revised. The determination of causal connexions, as it proceeds, will react on the material, suggesting improvements in classification and the ascertainment of new data. In the meantime the author considers himself justified in stating, as the result of the application already made of his method to the matter in hand, that "the institutions of man are as distinctly stratified as the earth on which he lives. They succeed each other in series substantially uniform over the globe, independent of what seem the comparatively superficial differences of race and language, but shaped by similar human nature acting through successively changed conditions in savage, barbaric and civilised life."

The special subject of the paper is, as the title indicates, the formation of laws of marriage and descent. A beginning of the investigation is made by inquiry as to the causal connexions of a particular custom of "ceremonial avoidance" between husbands and their wives' relatives. The number of "adhesions" of this with the custom of residence of the husband with the wife's family is ascertained from the tables, and, by calculation in the manner described, the existence of a causal connexion between the two customs is proved. An explanation of this connexion is suggested, and the connexions of these with other customs are investigated. On comparison of the results, the only conclusion consistent with the relations established is found to be that the direction of the social movement is from permanent residence of the husband with the wife's family, through an intermediate stage of residence followed by removal, to residence of the wife on the husband's side from the first. The next problem taken up is that of the order in which the matriarchal or "maternal," the patriarchal or "paternal," and the intermediate or "maternal-paternal" systems of kinship have succeeded one another. By determination of the connexions of each system with the customs of the 'levirate' and the 'couvade,' it is established that "the distribution of customs is only compatible with a tendency of society to pass from the maternal to the paternal system". This result is brought into comparison with the result as regards residence, and, by further application of the method, the movements from the maternal to the paternal system, and from residence on the wife's to residence on the husband's side, are found to be causally connected. The hypothesis now suggests itself "that in the one simple fact of residence we may seek the main determining cause of the several usages which combine to form a maternal or paternal system"; and the actual movement, if determined by this cause, is found to be "consistent with what our knowledge of human nature would lead us to expect". The author next seeks to discover the connexions of "marriage by capture" with the three systems of kinship and with exogamy; going on afterwards to investigate the connexion of this last with "classificatory relationship". No causal connexion of capture with exogamy is dis-

covered; but exogamy and classificatory relationship are found to be so connected that they may be regarded as "two sides of one institution". Lastly, a conjecture, based on this result and on the records of observers, is thrown out as to the origin of exogamy.

The outline of the general course of the author's argument given in the foregoing paragraph, meagre as it is, may perhaps help to make clear the mode of application of the method. It can of course convey no idea of the art with which the development of institutions is traced out in the paper itself.

THOMAS WHITTAKER.

PROF. O. N. ROOD, ON COLOUR-CONTRAST.

Prof. Ogden N. Rood, of Columbia College, New York, whose valuable work in reference to the physics of colour is well known, announces certain results as the outcome of an exhaustive quantitative evaluation of colour-contrasts, which cannot fail to prove valuable and suggestive to psychologists. The detailed account of his work will appear in *The American Journal of Science.*

(1) The commonly entertained notion that the effect produced upon any colour A by contrast with any other colour B is identical with the effect which would be produced by the superposition upon A of B's complementary colour, he finds not to be borne out by the facts. The two sets of phenomena approach one another so closely in certain parts of the spectrum that the common basis of the two has not unnaturally been accepted. But in certain parts of the spectrum the difference between the contrast-effect and the proper complementary colour is so marked that the observer not only finds no difficulty in distinguishing the two, but is able to remember the difference from one day to the next, and to pick out the two colours and distinguish them correctly. This difference is most marked in the blue-violet region of the spectrum. This result in a general way leads us to consider retinal fatigue as an element of less importance in the production of colour-contrast than it is generally supposed to be, tends to emphasise the importance of elements of higher mental activity, and indirectly bears against all over-emphasis of action in terminal organs in the consideration of mental complexes. This over-emphasis now appears in many directions as a marked and evil result of the generally valuable psycho-physic study, which in late years has become so important a part of psychology.

(2) The other result brought out by Prof. Rood's experiments which is of special interest to the psychologist is the fact that contrast-effects are not at all of equal intensity in the different regions of the spectrum. The contrast-effects produced by colours of the red end of the spectrum are of much less intensity than those produced by the greens and blues. The colours approaching the violet end produce less contrast-effect than those in the region of the green, but more than those towards the red end. This is a fact which could not be looked for under Young's theory of colour; but, apart from the value which it is likely to have in the determination of the Helmholtz *v.* Hering controversy as to the physical basis of colour-sensations, it seems probable that here too we are likely to find an argument in favour of the greater importance of higher psychic action in those exceedingly complex psychoses which seem so simple when we call them colour-contrasts. The experiments seem to show indications of the existence of a relation between the effects of contrast and the vividness of the field of attention which may lead to generalisations of value.

HENRY RUTGERS MARSHALL.

PSYCHOLOGY IN RUSSIA.

A Russian society for the study of Psychology has now been in existence for four years. M. Lutoslawski, who is one of the members, sends at the request of the President an interesting and very full account of the constitution of the Society, of its proceedings from the beginning, and of the work it has in prospect. Limits of space forbid the printing of the whole, but a summary is given based on M. Lutoslawski's communication. The Psychological Society of Moscow was founded on 24th Jan., 1885. Its foundation was due chiefly to the initiative of Prof. Troitski, who then held the philosophical chair in the University of Moscow. It has at present 140 members (of whom 118 are "active") and numbers among its honorary members Profs. Bain, Ribot and Wundt. Though founded with a view to the special study of psychological science, it has not been able to maintain the specialist character, but, while not ceasing to be psychological (as is shown by the titles of the papers read), has had to appeal to general philosophical interests. The first subject to excite lively discussion was, indeed, that of Free-will; and the Society is now on the way to become a *Philosophical* Society. At present what is aimed at is mutual understanding on fundamental questions. Different views as to psychological method, for example, have been laid before the Society by Prof. Troitski and by Prof. N. Grote (who has succeeded him in the presidency of the Psychological Society as well as in the chair of Philosophy at Moscow); the former insisting more on the importance of the new "physiological psychology" and the latter on the scientific value of what has been done already by the "metaphysicians". The general tendency of the discussions, it is thought, has been away from the exclusively "positivistic" theories. Desire for independent thinking—thinking independent of "the authorities of the West"—has come to be more and more felt; and with a view to its satisfaction the first Russian philosophical journal is this year to be started, under the direction of the President, who will be aided by the collaboration of many of the members. The Review will be at the same time the organ of the Society, and will reproduce the more important discussions. Finally, one of the members, M. N. Stolipine, has made a gift to the Society of 2000 roubles, for distribution in prizes to be offered for the best works attempting the solution of a philosophical question. Last year the centenary of Schopenhauer's birth was celebrated by discourses on his life and various aspects of his philosophy. Among other contributions, papers were read in the course of the year on "Psychological Research in Wundt's Laboratory at Leipsic," "The Relation between the Methods and Aims of Philosophy and Psychology," "Hypnotism," "Mental Suggestion," "Morals and Æsthetics".

THE ARISTOTELIAN SOCIETY FOR THE SYSTEMATIC STUDY OF PHILOSOPHY (22 Albemarle Street, W.).—Since last notice the following papers have been read:—Dec. 17, by Mr. G. J. Romanes, F.R.S., on "The Doctrine of Moral Responsibility"; Jan. 14, by Mr. M. H. Dziewicki on "The Standing-point and First Conclusions of the Scholastic Philosophy"; Jan. 28, by Professor A. Bain, LL.D., V.P., on "The Empiricist Position"; Feb. 11, by the Rev. J. Lightfoot, D.Sc., on "The Philosophy of Revelation"; and Feb. 25, by Mr. B. Hollander. "Do separate psychological functions require separate physiological organs?"

Karl v. Prantl, author of *Die Geschichte der Logik im Abenlande* (4 vols., 1855-70) and other works, professor at Munich from 1859, died in September, 1888. He was born at Landsberg am Lech in 1828.

IX.—FORTHCOMING WORKS. FOREIGN PERIODICALS.

Principles of Empirical or Inductive Logic. By JOHN VENN, Sc.D., F.R.S., Lecturer in the Moral Sciences, Gonville and Caius College, Cambridge. London: Macmillan & Co. Pp. 590.

"This presently forthcoming volume contains the substance of lectures delivered for a number of years in Cambridge: at first to members of Caius College, but afterwards, in accordance with the inter-collegiate lecture system, to students in the University generally. The form in which they here appear is, of course, new; the arrangement having been entirely recast, and every attempt made to bring them up to date. The reader will probably find that here—as in the case of most writers of the middle generation, and especially most of those who approached the subject of Logic with some previous physical and mathematical training—the dominant instigating influence was that of Mill. But he will readily see that that influence has assumed subsequently the attitude of criticism quite as much as that of agreement; and that, in fact, the points of divergence from that author are numerous and important. The fundamental conception of the nature and province of Logic, as here expounded, is rather that of Physical Science than that of Metaphysics or Psychology; and the treatment aimed at throughout is constructive rather than critical or historical. The general attitude towards phenomena adopted is substantially that with which Mill first familiarised English readers—the attitude, that is to say, which postulates an external world, distinct from the logician, and which it is his business to reduce to order, with the view of drawing inferences about past, present and future events. The divergences from Mill's treatment are largely the result of an attempt to carry out this attitude more consistently, to meet the principal speculative difficulties which it encounters, and to revise it by the results of evolutionary and other modern scientific conceptions. The attempt thus indicated has demanded some departure from the traditional treatment of Logic partly in respect of what has been omitted, but principally in respect of what has been inserted. Some of the more important problems included under the latter heading may be summarised as follows:—A general statement and description of the main postulates which a Material or Objective Logic has to demand from Psychology, Metaphysics, Science and elsewhere; postulates always implicitly involved but seldom explicitly enunciated (c. i.);—The Law of Causation as it is required, and practically employed, for inferential purposes, and in its relation to the general Uniformity of Nature (cc. ii.-iv.);—The Hypothetical Judgment, its origin and foundation in human experience (c. x.);—Scientific Definition (c. xi.);—Analysis and reconsideration of the Four Methods of Inductive Inquiry (c. xi.);—The processes of Hypothesis, Analysis and Synthesis, as demanded in Material Logic (c. xvii.);—Standards and Units, physical and psychical (cc. xviii., xix.);—The data of Geometry; certain difficulties connected with their conception and application (c. xx.);—Attempts at the introduction of a Universal or Perfect Language (c. xxii.);—Extensions

of our general powers of Observation, regarded as a sort of control over Space and Time (c. xxiii.);—The Ideal of Logic and Methodology, or the degree of perfection at which we can hope to aim (c. xxiv.);—Speculation and Action, or the logical and scientific view of the world, as modified by our practical tendencies (ch. xxv.)."

Moral Order and Progress: An Analysis of Ethical Conceptions. By S. ALEXANDER, Fellow of Lincoln College, Oxford. London; Trübner & Co. Pp. xxiv., 412.

"This presently forthcoming work is an account of the various elements contained in the phenomena of order and progress which are shown to be essential to morality. Its method is that of grouping ethical facts under the main working conceptions used in practice. The author discusses ethical data for themselves, and, while discarding metaphysics, takes up an independent position towards biological ideas. But, though he insists on the characteristic differences of moral action, the result of the book is to confirm the theory of Evolution, by showing that these differences are such as should be expected if that theory were true. In the preface the author writes that he has come to these biological ideas as employed in Ethics with a training derived from Aristotle and Hegel, and has found not antagonism, but fulfilment. The work falls into three books. Book i. is preliminary and discusses the nature of Conduct and Character, examining their different elements in relation to one another; and it concludes by defining, on the strength of this analysis, the relation of Ethics to the kindred sciences, the Natural Sciences, Psychology and Metaphysics. Book ii. is entitled 'Moral Order,' and deals, in two parts, with the Statics of morality, traversing the field usually covered by ethical treatises. The first part is mainly occupied with the question 'What is meant by calling an act good or bad?' The answer given is that goodness means equilibrium or proportion between persons in a society, or functions in an individual. The second part discusses the Moral End. The standard of equilibrated conduct is shown to be prior to and to include other criteria, such as perfection, pleasure, vitality, the nature of which is discussed later on. Book iii. is Dynamical, and treats of 'Moral Progress'. Having explained morality to be in constant and continuous change, the author attempts to prove that moral distinctions arise by a process the same as that which produces species in the organic world, by a struggle, not between societies, but between *ideals*. He next deals with Punishment, Responsibility and Education, the institutions for the 'Maintenance of Moral Ideals'; and then carries out the idea of a struggle of ideals, using it to account for the historical phenomena of morality, discussing the question of the criterion, and attempting to explain the law of progress. Finally, he raises the question whether duty is the highest moral principle. The work is founded on a dissertation for which the author obtained the Green Moral Philosophy Prize at Oxford in 1887."

First and Fundamental Truths. By JAMES M'COSH, D.D., late President of Princeton College. London: Macmillan & Co. Pp. 350.

"The author of this presently forthcoming work believes that, as Aristotle has determined in his logic the laws of discursive thought, so it is possible in metaphysics to ascertain the nature and the laws of primitive or fundamental thought. He has enumerated and classified these primary truths, and examined them carefully under the head of

Cognitions, Beliefs and Judgments. He has given the tests by which they are easily distinguished from all other and derivative truths; they are Self-Evidence, Necessity and Catholicity. He shows that these first principles, as intellectual and moral, are involved in the practical affairs of life, and in all the sciences, even the physical. In conducting this investigation, he avoids scepticism on the one hand, and idealism on the other. He separates himself from that English School which, following Hume and John S. Mill, deny that there is any fundamental truth, and from the German School of Kant, who maintain that we know things only under forms imposed by the mind, a doctrine which has led to a more formidable scepticism than that of Hume. In doing this, he is seeking to establish a Realistic Philosophy which he says ought to be the special American Philosophy".

American Journal of Psychology.—Vol. ii., No. 1. E. C. Sanford—Personal Equation (i.). W. H. Burnham—Memory, historically and experimentally considered (i.). ["An Historical Sketch of the Older Conceptions of Memory."] M. P. Jacobi—The Place for the Study of Language in a Curriculum of Education. [Systematic training of the senses should come first (up to the age of 7), then language (from 7 to 14 or 15), and lastly science. Several European languages (among them Greek and Latin) are to be studied simultaneously, their mutual relations making it possible thus to economise the time spent in learning each. When the power of reading has been acquired, and not till then, grammar should be systematically taught. The abstractions of language being the condition of all other abstractions, the discipline of grammar is the best introduction to the study of science in general, which may now follow.] Psychological Literature (The Nervous System; Experimental; Abnormal; Miscellaneous). Notes.

Revue Philosophique.—An. xiv., No. 1. P. Janet—Introduction à la science philosophique. iv. Rapports de la philosophie et de la théologie. F. Paulhan—L'abstraction et les idées abstraites (i.). C. Dunan—Un nouveau cas de guérison d'aveugle né. [The author describes experiments on the visual perceptions of a girl of thirteen who has been successfully operated on for congenital cataract. The principal facts brought out are that ten days after the operation the contours of objects were distinguished by the eye alone, but that scarcely any progress had been made towards perception of distance. From the results of his observations the author argues that "vision, at least that of superficial extension, owes nothing to the muscular sensations occasioned by the movement of our limbs".] Rev. Gén. (P. Tannery—Travaux récents de philosophie mathématique et de psychophysique). Analyses, &c. Rev. des Périod. Société de Psychologie physiologique (Burot—De l'auto-suggestion en médecine légale). No. 2. Ch. Lévêque—L'esthétique musicale en France. Psychologie du quatuor. A. Binet—Recherches sur les altérations de la conscience chez les hystériques. [The special points studied in this paper—which is one of a series interrupted a year and a half since—are the production of movements and perceptions in hysterical subjects by excitation (unknown to the patient) of an anæsthetic limb. An attempt is made to determine the relations of the

conscious and unconscious elements in the perceptions.] F. Paulhan—L'abstraction, &c. (fin). [The author seeks to trace the development of abstract ideas, not from "the concrete," but from a certain formless primitive state in which concrete and abstract are alike involved. Points discussed by him are the abstraction of the immaterial soul—which, he contends, is never cleared altogether of ideas of a material substratum—and the general "tendency of the concrete image to be preserved and to reappear as soon as the occasion presents itself"; this last point being illustrated from literature.] Notices bibliog. (F. Darwin, *Vie et correspondance de C. Darwin*, ii., &c.). Correspondance (M. Blondel—L'agrandissement des astres à l'horizon). Rev. des Period. Société de Psych. physiol. (Dufay—La vision mentale ou double vue dans le somnambulisme provoqué et dans le somnambulisme spontané). No. 3. F. Evellin—La pensée et le réel. [An argument against phenomenalism on the grounds that its "law of dispersion without limit" makes all synthesis impossible, and that the phenomenon, since it is necessarily "inert," must yield the primacy, as principle of explanation, to "being," which is necessarily "active".] H. Beaunis—La douleur morale. [All physical pain is accompanied by some mental pain (douleur morale), and all mental pain by some physical pain. The physiological reason of this is that physical and mental pains have their seat in lower and higher nervous centres respectively, and that there is irradiation from the lower into the higher and from the higher into the lower. Pains of each kind may be subdivided into pains of (1) fatigue, (2) inhibition, (3) inaction. Mental pains generally may be divided into "emotional" and "intellectual" pains.] P. Regnaud—L'évolution phonétique du langage. [In opposition to the "neo-grammatical" school, the author contends that phonetic changes have their origin, not in a kind of "epidemic," but in "individual defects of pronunciation" voluntarily imitated. The new sounds that are imitated are always such as require less expenditure of muscular effort than the old ones.] Analyses, &c. (A. Bain, *English Composition and Rhetoric*, &c.). Rev. des Période. Correspondance (G. Vandame et P. Tannery—Sur la notion de temps). Société de Psych. physiol. (L. Manouvrier—Les premières circonvolutions temporales droite et gauche chez un sourd de l'oreille gauche).

La Critique Philosophique (Nouv. Sér.).—An. iv., No. 12. Réponse de M. W. James aux remarques de M. Renouvier sur sa théorie de la volonté. C. Renouvier—Quelques mots sur la lettre qui précède. . . . H. Bois—Une leçon d'ouverture. Kant—*Les Principes métaph. de la science de la Nature*, c. ii. (trad.). An. v., No. 1. C. Renouvier—Victor Hugo. Le poète et le songeur (i.). H. Dereux—Du fondement de la morale d'après Herbart (ii.). L. Dauriac—Pessimisme et stoïcisme. [The author contrasts the consistency of the Stoics, in respect of the relations between their theory and practice, with the inconsistency of modern pessimists.] . . . Kant—*Les Principes*, &c., c. iii. (trad.). No. 2. C. Renouvier—Victor Hugo, &c. (ii.). [This, with the article in the preceding number, makes up the first chapter of a literary and philosophical study of Victor Hugo. The mythological genius, or personifying imagination,—present to a degree of which the ancients themselves, in the time of Horace and Virgil, had long since ceased to have examples,—is what the author so far finds to be most characteristic of Hugo as a poet.] C. Dollfus—Un apôtre. [The "apostle" who is here made to expound his ideas is an enthusiast for the survival of the fittest as promoted by nature in the "struggle for

life ".] G. Mille—Rôle de l'objet et du sujet dans les théories grecques de la connaissance. C. Renouvier—Léon Penchinat. . . . Kant—*Les Principes*, &c., c. iv. (trad.).

RIVISTA ITALIANA DI FILOSOFIA.—An. iv. 1, No. 1. R. Mariano—La persona del Cristo. N. Fornelli—La pedagogia e l'insegnamento classico. V. Benini—L' avvenire dell' estetica (i.). [The author discusses the future of art as affected by science. In the present article he states the case of those who regard the spirit of modern science as hostile to art.] S. Fimiani—Alcune osservazioni su la relazione tra il νοῦς e la ψυχή nella dottrina filosofica di Anassagora. [An attempt to show that Anaxagoras did not, as is related by Aristotle, identify the νοῦς with the ψυχή, but distinguished the former as intellectual from the latter as sensitive.] Bibliografia, &c.

RIVISTA DI FILOSOFIA SCIENTIFICA.—Vol. vii., No. 11. G. Marchesini—La naturalità del "pensiero". V. Grossi—La cremazione fra i moderni non-Europei. Riv. Gen. (N. Colajanni—Concetto e limiti della sociologia criminale). Riv. Bib., &c. (E. Spencer, *I primi principii;* B. Bosanquet, *Logic;* D. Kay, *Memory*, &c.). No. 12. R. Ardigò—La scienza sperimentale del pensiero. G. Dandolo—L'inconscio fisiologico e la psicologia del sonno. Note critiche e communicazioni. Riv. Anal. Riv. Bib., &c. Vol. viii., No. 1. E. Morselli—L'evoluzionismo monistico nella conoscenza e nella realtà. [From a forthcoming work on General Anthropology.] L. Maggi—La trasformazione della specie microbica. Note critiche, &c. (F. de Sarlo—La filosofia, la scienza e il Darwinismo. [An argument, based on Prof. Angiulli's *La Filosofia e la Scuola*, for the recognition of philosophy in its distinction from special science.]) Questioni del Giorno (G. de Mortillet—Riforma dei programmi d'insegnamento nelle scuole primarie e secondarie). Riv. Anal. Riv. Bib., &c.

ZEITSCHRIFT FÜR PHILOSOPHIE, &c.—Bd. xciv., Heft 2. H. Siebeck—Die Anfänge der neueren Psychologie in der Scholastik (ii.). [With this article the author arrives at Duns Scotus, whom he finds to be of special importance in relation to the beginnings of modern psychology; no one else since Augustine, within the limits of the traditional framework of Scholasticism, having made so many good, and at the same time independent, psychological observations.] R. Manno—Wesen und Bedeutung der Synthesis in Kant's Philosophie (Schluss). R. Seydel—Albert Langes geometrische Logik. J. Witte—Die simultane Apprehension bei Kant. Recensionen, &c.

PHILOSOPHISCHE MONATSHEFTE.—Bd. xxv., Heft 3, 4. Th. Lipps—Psychologie der Komik (iv.). E. König—Maine de Biran, der französische Kant. [A comparison between Maine de Biran's and Kant's doctrine of "the spontaneity of the subject". Kant's "spontaneity" is viewed as an epistemological hypothesis, Maine de Biran's as a psychological fact, discovered independently of Kantian influences and by a method different from the Kantian.] A. Elsas—Das Princip der Erhaltung der Energie. P. Natorp—Zur Philosophie und Wissenschaft der Vorsokratiker. [A critical review of M. Paul Tannery's *Pour l'Histoire de la Science Hellène.* While bringing out appreciatively the merits of M. Tannery's book and accepting some of his new results, the author defends the more usual opinions against the "revolutionary" positions taken up in it on some special points.] Litteraturbericht (D. Hume, *Eine Untersuchung in Betreff des menschlichen Verstandes*, übers. von J. H. v. Kirchmann, &c.). Bibliographie, &c.

ZEITSCHRIFT FÜR VÖLKERPSYCHOLOGIE U. SPRACHWISSENSCHAFT.—Bd. xix., Heft 1. L. Erhardt—Zur homerischen Frage. K. Schultz—Die Rede (ratio, λόγος). [On the fundamental place of the idea of God in the history of thought.] W. Schwartz—Die melkenden Götter bei den Indogermanen. K. Borinski—Zur Legende von Robert dem Teufel. [An attempt to identify "Robert the Devil" with Robert Guiscard.] Beurteilungen.

VIERTELJAHRSSCHRIFT FÜR WISSENSCHAFTLICHE PHILOSOPHIE.—Bd. xiii., Heft 1. A. Meinong—Ueber Begriff und Eigenschaften der Empfindung (Schluss). K. Lasswitz—Galilei's Theorie der Materie (Schluss). F. Staudinger—Identität u. Apriori (i.). [The first part of an inquiry into the grounds for assigning objective validity to inferences drawn from "already formed concepts".] B. Kerry—Ueber Anschauung und ihre psychische Verarbeitung (v.). Anzeige. Selbstanzeigen, &c.

PHILOSOPHISCHE STUDIEN.—Bd. v., Heft 3. W. Wundt—Biologische Probleme. [A biological chapter of a forthcoming comprehensive work on philosophy. The author discusses the chief questions of speculative biology; setting forth, in particular, a "principle of threefold explanation," according to which every organic process may be viewed from the "physico-chemical," the "physiological" and the "psychological" points of view. Sometimes one and sometimes another of these is actually the only point of view from which scientific explanation can be attempted; but a process may always be speculatively considered under all three. An implication of the principle is that cell-division and protoplasmic contraction, the two earliest vital processes, have a psychical aspect. Therefore, since every psychical process is at bottom an act of will, will is present from the beginning of organic life.] O. Külpe—Die Lehre vom Willen in der neueren Psychologie (Schluss). A. Kirschmann—Ueber die Helligkeitsempfindung im indirecten Sehen.

ARCHIV FÜR GESCHICHTE DER PHILOSOPHIE.—Bd. ii., Heft 2. H. Diels—Thales ein Semite? [That the attempt to make out a Phœnician origin for Thales cannot be sustained.] A. Gercke—Die Hypothesis in Platon's *Menon*. O. Kern—Zu der platonischen Atlantissage. H. Siebeck—Zur Psychologie der Scholastik. [On Alexander of Hales, John of Rochelle and Albert the Great.] L. Stein—Antike und mittelalterliche Vorläufer des Occasionalismus. [A very interesting account (extending over pp. 192-245 and divided into an introduction and five chapters) of the reconciliation of free-will and determinism attempted by Cleanthes within the Stoic school, by Al Ascha'ri, the founder of the Arabian school of the Ascharîja, by the mystic Richard of St. Victor, and by the Occasionalists. Having shown how, with different philosophical antecedents and under quite different historical conditions generally, precisely the same solution of the same philosophical problem was arrived at, the author asks finally whether any direct historical relation can be traced among its discoverers. He finds that there is incontestable proof that the solution of Al Ascha'ri could not have been derived from the Stoics, and that in the other cases the hypothesis of borrowing is highly improbable. Dr. Stein has already written (more briefly) on the same topic in his *Psychologie der Stoa*, ii. (see MIND xiii. 303).] K. Köstlin—Ein Hymnus auf Immanuel Kant. B. Erdmann—Zwei Briefe Kants. Jahresbericht (E. Zeller, B. Erdmann, J. G. Schurman). Neueste Erscheinungen.

PHILOSOPHISCHES JAHRBUCH.—Bd. i., Heft 4. C. Gutberlet—Gottesbeweis oder Gottesbeweise. J. Costa-Rossetti—Die Staatslehre der christlichen Philosophie (i.). [The first part of a summary of a doctrine of the State that has already been set forth by the author in a systematic work. His aim has been to build up out of the "ideas and principles" for a political doctrine that are to be found in the philosophico-theological works of the Scholastics and in their commentaries on Aristotle such a harmonious structure as they themselves had before their minds.] Praxmarer—Die Controverse zwischen Vasquez u. Suarez über das Wesen des Naturgesetzes. Nachwort der Redaction. Recensionen und Referate. Zeitschriftenschau. Miscellen und Nachrichten.